Parts No. OS3-088

OTARI®

MTR-10 II and 12 II
SERIES PRODUCTION TAPE RECORDERS
OPERATION AND MAINTENANCE MANUAL

MTR-10-C Overbridge Model

Edition No. 6
Printed : May 1989

SAFETY INSTRUCTIONS

1. Read Instructions — All the safety and operating instructions should be read before the appliance is operated.

2. Retain Instructions — The safety and operating instructions should be retained for future reference.

3. Heed Warnings — All warnings on the appliance and in the operating instructions should be adhered to.

4. Follow Instructions — All instructions should be followed.

5. Water and Moisture — The appliance should not be used near water - for example, near a bathtub, washbasin, kitchen sink, laundrytub, in a wet basement, or near a swimming pool, etc.

6. Carts and Stands — The appliance should be used only with a cart or stand that is recommended by the manufacturer.

7. Ventilation — The appliance should be situated so that its location or position does not interfere with its proper ventilation.
   For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation operatings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

8. Heat — The appliance should be situated away from near sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.

9. Power Sources — The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

10. Grounding or Polarization — Precautions should be taken so that the grounding or polarization means of an appliance are not defeated.

11. Power-Cord Protection — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs. Convenience receptacles, and the point where they exit from the appliance.

12. Cleaning — The appliance should be cleaned only as recommended by the manufacturer.

13. Nonuse Periods — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

14. Object and Liquid Entry — Care should be taken so that

COMMUNICATION WITH OTARI

FOR SERVICE INFORMATION AND PARTS

All Otari products are manufactured under strict quality control. Each unit is carefully inspected and tested prior to shipment.

If, however, some adjustment or technical support becomes necessary, replacement parts are required, or technical questions arise, please contact your Otari dealer or contact Otari at:

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Another part of Otari's continuing technical support program for our products is the continuous revision of manuals as the equipment is improved or modified. In order for you to receive the information and support which is applicable to your equipment, and for the technical support program to function properly, please include the following information, most of which can be obtained from the Serial number label on the machine, in all correspondence with Otari:

* Model Number:
* Serial Number:
* Date of Purchase:
* Name and address of the dealer where the machine was purchased and the power requirements (voltage and frequency) of the machine.

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IMPORTANT NOTICE

May 18, 1987

Applies to all MX-5050*, MTR-10, MTR-12, MTR-20, MX-70 and MX-80 machines.

The Capstan Motors in these machines contain an oilite bearing at the front end, which requires lubrication.
USE ONLY OTARI OIL P/N PZ9E003.

To access the bearing for lubrication, remove the capstan shaft dust cap. On most machines the dust cap unscrews. On MTR-20s the dust cap is located under the head assembly base, and snaps off the top of the motor.

There are two basic types of motors; one which has a foam ring surrounding the bronze colored oilite bearing, and one which has a felt pad on top of the bronze colored oilite bearing.

If the motor has a felt pad on top of the bearing, remove the pad, and insert three drops of oil in the cavity surrounding the bearing.

If the motor has a foam ring surrounding the bearing, apply three drops of oil to the foam ring.

Apply one drop of oil every 3 to 6 months depending on machine usage.

Do not over lubricate, and be careful not to apply oil to the portion of the capstan shaft which contacts the tape.

* NOTE; Early MX-5050, BGM-1000 and ARS-1000 machines use a belt-driven Capstan Shaft. The Capstan Shaft assembly contains an oilite bearing in the same location and the same lubrication procedures should be followed.

  Use MOBILE DTE oil LITE for those machines instead of PZ9E003.

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Switch	Function	Factory Setting
SW3-5	Fast Winding tape speed deceleration ON : No deceleration at the end of tape OFF : Deceleration at the end of tape only with 7" reel	ON (MTR-10) OFF(MTR-12)
SW3-6 to SW3-8	Not used	
SW4-1	Not used on MTR-10/12 series	OFF
SW4-2	Dump Edit mode selection ON : Transport will enter Dump Edit mode when the safety arm switch is activated by stopping the take-up reel. OFF : Trasport will stop when the safety arm switch is activated.	OFF
SW4-3	Vari-Pitch in Record mode ON : When Vari-Pitch mode is selected, the machine can enter Record mode. OFF : When Vari-Pitch mode is selected, the machine can not enter Record mode.	ON
SW4-4	Stop mode priority selection ON : Play mode will continue even when PLAY and STOP buttons are pressed. OFF : transport will stop when both buttons are pressed simultaneously.	OFF

Switch	Function	Factory Setting
SW4-5 and SW4-6	Punch In selection	OFF, OFF

OFF OFF : Pressing the RECORD button
(ON ON) during Play mode causes the machine to enter Record mode.

ON OFF : Pressing the RECORD and PLAY buttons simultaneously during Play mode causes the machine to enter Record mode.

OFF ON : Pressing the RECORD button during Stop mode causes the machine to enter Record mode.

SW4-7 Punch Out selection — OFF

ON : Punch Out is inhibited. The machine does not leave Record mode by pressing the PLAY button during Record mode.

OFF : Pressing the PLAY button during Record mode causes the machine to leave Record mode.

NEWLY ADDED OPEATION WITH PB-4GEA MASTER CPU P.C.B. ASSEMBLY

The latest MTR-10/12 Series machine using PB-4GEA MASTER CPU P.C.B. assembly has attained following two operations.

1) Reverse Erase operation

Set the proper audio channel to Record mode, then press the RECORD, REWIND and PLAY buttons simultaneously. The MTR-10/12 enters Record mode and the Erase and Record Bias are activated, but the transport does not move tape.
By spooling tape backward by hand, Reverse Erase mode starts.
Press the STOP/LOAD button to leave the Reverse Erase mode.

2) Reverse Play operation

Press the REWIND and PLAY buttons simultaneously, then the transport moves backward the tape.

Those two operations are selectable by the switches on CPU P.C.B. assembly. Refer to the following table.

Add the following description to pages 3-6, 3-7, 3-19, and 6-7 of the MTR-10 II/12 II manual (OS3-088).

"Press the EDIT/UNLOAD button (instead of the CUE button) simultaneously with the F.FWD or RWD button to enter Forward or Reverse Spooling mode."

The new CPU PCB assembly has three DIP switches for user function selections. Refer to the following table describes the function of DIP Switches 2, 3 and 4.

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Switch	Function	Factory Setting
SW2-1	Output muting on entering Stop mode ON : Muting OFF : No Muting	ON
SW2-2	Output muting in Fast Wind mode ON : Muting OFF : No Muting	ON
SW2-3	Output muting on entering Play ON : Muting OFF : No Muting	OFF
SW2-4 to SW2-8	Not used	
SW3-1	Fast Spool tape speed selection ON : Standard tape speed OFF : Lower tape speed	ON
SW3-2	Reel type selection for end-of-tape sense ON : DIN REEL (See SW3-5) OFF : NAB REEL (See SW3-5)	OFF
SW3-3	Reverse Erase mode selection * ON : Reverse Erase Enabled OFF : Reverse Erase Inhibited	OFF
SW3-4	Reverse Play mode selection ON : Reverse Play Enabled OFF : Reverse Play Inhibited	ON

* In order to enter Reverse Erase mode, press REC, RWD and PLAY buttons at the same time or press PLAY button while REC (first) and RWD (second) buttons are held. Spool the tape by hand in the reverse direction only to start Reverse Erasing.

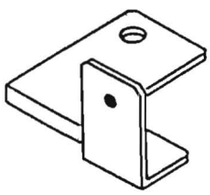
  NOTE: Spooling tape in the forward direction will record any incoming signals present at the input connectors.

KW-4Y-D Brake Stopper Kit

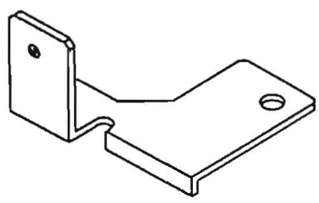
This kit lengthens the life span of the current brake mechanism of MTR-10 and 12 series.

1. Parts List

Name	Otari Parts No.	Quantity
Stopper Plate L	KW4Y002	1
Stopper Plate R	KW4Y003	1
M3 x 15 Cap Screw	F22315SB	2
M3 Nut	F50003SN	2



Stopper Plate L
(Supply Side)



Stopper Plate R
(Takeup Side)

Figure 1
Stopper Plates

2. Installation (Refer to Figure 2)

1. Raise the Transport Deck Panel.
2. Remove the protect cover which covers the brake mechanism at the bottom of the Reel Motor.
3. Attach the stopper plate to the brake base with M4 screw (marked "A" in Figure 2). Set the stopper plate position by fitting the angle portion to the brake base plate, and tighten the M4 screw.
4. Referring to Figure 2, attach the Hex Socket Head Bolt (M3 x 15) and Hex Nut (M3) to the stopper plate.

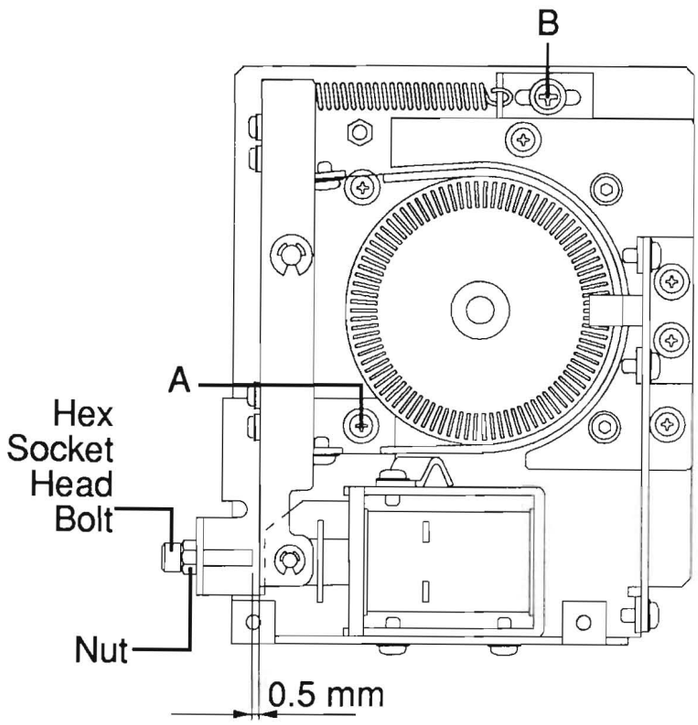


Figure 2
Installation of Stopper Plate

3. Adjustment

1. Attach one end of a 6ft (2m) piece of string to the hub of a 7" large hub reel. Attach the other end of the string to the spring scale.

2. Place the reel on either Supply Reel Table or Take-up Reel Table. Wind the string so that the reel rotates counterclockwise (for Supply Reel) or clockwise (for Take-up Reel) when the string is pulled.

CAUTION: At this stage, loosen the Hex Socket Head Bolt so that the end of the bolt does not touch the brake arm when rotating the reel in Holdback direction.

3. Pull on the spring scale slowly to unwind the string. Write down the reading of the scale. Repeat the measurement several times, and average the data. Adjust the position of the spring hook by loosening the screw B so that the scale reading becomes 350 ~ 400g (equivalent to 1.75 ~ 2.0 kgcm shaft torque).

4. Tighten the Hex Socket Head Bolt until the gap between the end of the bolt and the brake arm becomes about 0.5mm.

5. Adjust the brake torque of Holdback direction by turning the Hex Socket Head Bolt so that the torque becomes the value described in the following table.

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SECTION 1

INTRODUCTION

1.1 USING THIS MANUAL

OTARI's master production tape recorder MTR-10 and MTR-12 series are available in many variations. The major difference between the MTR-10 series and the MTR-12 series is that the size of the largest usable reel for the MTR-10 is 10-1/2" (26.7 cm) while the largest reel size for the MTR-12 is 12-1/2" (31.75 cm). There are no other functional differences between the two series. Each series has several variations as shown in the following table.

MTR-10/MTR-12 SERIES MODEL LIST

Type	Tape Width	Tape Speed	Catalog Number	Head	Console	
					Low Profile	Over-bridge
MTR-10	1/4"	* 30 ips 15 ips 7.5 ips	MTR-10-2	2T 2CH	O	
			MTR-10-C	2T 2CH		O
			MTR-10-K	2T DIN Stereo	O	
			MTR-10-M	2T DIN Stereo		O
	1/2"		MTR-10-G	2T 2CH	O	
			MTR-10-H	2T 2CH		O
			MTR-10-4	4T 4CH	O	
			MTR-10-I	4T 4CH		O
MTR-12	1/4"		MTR-12-2	2T 2CH	O	
			MTR-12-C	2T 2CH		O
			MTR-12-K	2T DIN Stereo	O	
			MTR-12-M	2T DIN Stereo		O
	1/2"		MTR-12-G	2T 2CH	O	
			MTR-12-H	2T 2CH		O
			MTR-12-4	4T 4CH	O	
			MTR-12-I	4T 4CH		O

* Low speed versions (15, 7.5, and 3.75 ips) and center track versions can be ordered by adding an "L" or "T" suffix to each of the catalog numbers mentioned above. However, some models are not available in "L" and "T" versions.

Also other models are available, although not listed above. For further details, please contact your nearest OTARI dealer or OTARI representative.

This operation and maintenance manual is intended for use with the MTR-10 and MTR-12 series master production recorders. The descriptions and references refer to the MTR-10. If a difference between the series exists, the information specific to the MTR-12 will be found following the information for the MTR-10.

The various sections of this manual are divided by major topic (i.e., SECTION 2. INSTALLATION), and by sub topic (i.e., Section 2.2. Inspection). Within a sub section, the steps or topics are numbered (1, 2, ... etc.), and within these steps or topics, the details may be further divided numerically (2.2.1., 2.2.2, etc.) or alphabetically (A,B,...etc.).

Normal parentheses () are used for examples and parenthetic comments. Square brackets [ ] are used for references to callouts in certain illustrations. The square brackets in a given sub section are either all referenced to a particular illustration, as noted in that sub section, or are individually referenced (i.e., [Fig. 1-3, B], meaning callout "B" in Figure 1-3.).

Generally, we have used all upper case type to describe a particular switch or control when that item is similarly labeled on the actual equipment (i.e., the PLAY button). Where a switch or function is not labeled, or the reference is less clear, we capitalize only the first letter of the item (i.e., the Cue lever near the CUE button). Machine status or operating modes are usually described with an upper case first letter (i.e., you press the PLAY button to place the machine in Play mode).

The functional checkouts in Section 3 should be carefully performed when the MTR-10/MTR-12 is first set up. You will probably learn a great deal about how the machine operates while following this procedure, but it is not intended as a guide for recording and editing; that information is provided in a more useful format in Section 4. Parts Lists and P.C.B. assemblies are indexed in Section 12, parts lists and exploded view drawings are indexed in Section 13, and schematic diagrams are indexed in Section 14.

We encourage you to read this manual carefully now, and to again review it after you have had a while to become familiar with the MTR-10/MTR-12. The more you know about your machine, the more you can benefit from its many versatile features.

CAUTION

The DC reel motors develop substantial torque. Never place a hand, clothing or other objects inside, atop, or near a reel or anywhere along the tape path, when actuating the tape motion controls. When using the Auto Locator or a Remote Control Box, always make sure anyone near the transport is aware of the potential hazard posed by the high torque motors.

1.2 OTARI MTR-10 AND MTR-12 SERIES MASTER PRODUCTION RECORDERS

The Otari MTR-10 and MTR-12 series are fully microprocessor-controlled 1/4" and 1/2" tape recorder/reproducers. Tape movement is governed by a proven 8080A microprocessor (8085 on all MTR-12 and on MTR-10 with serial number suffix "K" and later) on the recorder's plug in CPU (central processing unit) board. Enhancing the CPU are four erasable programmable read-only memories (EPROMS: only one EPROM on all MTR-12 and on MTR-10 with serial number suffix "K" and later) which furnish the necessary firmware for controlling the machine's operating parameters and production features. Otari's research has led to the development of the proprietary microprocessor used in the MTR series, which economically raises the level of reliability due to the use of fewer electronic and mechanical parts -- fewer linkages, fewer relays, and fewer critical adjustments. Reel motor, capstan and transport control circuits are each contained on individual, modular plug-in circuit boards.

The MTR-10/MTR-12 has all the standard transport commands one would expect of a professional master recorder. The buttons have dual-level illumination, with the brightest one confirming the transport mode. In addition, its microprocessor based operation makes possible a variety of special features, like 3 play/record speeds, and the ability to run backwards at any of them. Normal play/record speeds are crystal locked for extreme accuracy, and there is also a built-in VSO (variable speed oscillator) to adjust pitch over a ±20% range relative to the selected nominal speed for re-timing edits or special effects. Additionally, an external frequency reference may be used to control the capstan speed, a feature used for remote pitch control or synchronizer interface. Interface to an editing system (i.e., a tape controller or SMPTE code synchronizer) is accomplished with a single rear-panel connector, and excellent tape slewing characteristics are obtained because the MTR-10 CPU automatically compensates for a high rate of change in the 9600 Hz input by applying dynamic braking when necessary.

Tape control on the MTR-10 is perhaps the most sophisticated of any professional tape machine on the market. For example, very high resolution constant tension is achieved without the use of tension arm sensors. An interrupt-driven software algorithm compares the rate of rotation of both reel motors with the otuput of the real-time tachometer idler. By knowing this information, the CPU calculates exactly how much tape is on each reel, and then commands the reel servo to provide an appropriate torque with each reel motor (via an 8-bit D-to-A converter). Additionally, LED/LDR sensors on the top panel tell the CPU whether a small or large reel is mounted on each turntable, so no manual switching is required. This system enables one to load any combination of different size reels, and "rock" tape with one hand without tape slack or spillage.

The MTR-10 is carefully engineered and constructed to handle

tape gently and keep it in perfect alignment. The capstan contacts the back of the tape (for less tape wear), and the pinch roller is relieved for extended roller life. The pinch roller is dual-solenoid actuated; it provides plenty of clearance when initially threading tape, but otherwise moves closer to the pinch roller for faster, quieter tape starts.

A single-board approach has been used for the record/play audio and bias circuits for each channel, simplifying setup and service. Utilization of high slew rate IC op-amps and discrete components at critical stages ensure the cleanest and quietest of recordings. Electronic alignment has been greatly simplified by providing separate controls for each speed (on those parameters that are likely to change with tape speed). For example, each channel has its own gain trimmers for repro (reproduce head playback) and sel-rep (record head playback), plus an input sensitivity trimmer and a record level trimmer. Each channel also has separate record and reproduce high frequency equalization trimmers for each of the three speeds, as well as record phase compensation trimmers. The phase compensation makes it possible to achieve nearly perfect square wave reproduction, and increases the recording level capability with complex waveforms for greater dynamic range. Low frequency compensation may be switch selected and trimmed for each channel. Repro level and record level can be manually adjusted on the MTR-10 front panel, or standard reference level can be instantly obtained by engaging an SRL switch adjacent to the controls; the standard reference levels are adjustable for each channel with SRL trimmers on the Audio boards.

Record bias level is adjusted with a trimmer on each Audio card, primarily to obtain equal bias for each channel. The Master Bias level is adjustable for all channels simultaneously with trimmers on the Audio Control board; bias may be set for each of the three operating speeds so that no re-adjustment is needed when changing speeds. A second set of three Master Bias trimmers may be switch-selected so that another tape formulation can be accommodated. For studios that often change tape speeds and formulations, this feature is a tremendous time saver. Another switch on the Audio Control board enables equalization to be set to NAB or IEC characteristics (for 7.5 or 15 ips); AES characteristic is automatically provided at 30 ips, as shown on the MTR-10 front panel indicators. In addition, the MTR-10 circuit calibration can be "zeroed" to any of three standard reference flux levels (185, 250 or 320 nanoWebers per meter) by moving a switch on the Audio Control board; the selected reference flux level is also indicated on the MTR-10 front panel.

A built-in test oscillator provides 100 Hz, 1 kHz and 10 kHz sine wave tone for alignment, plus 1 kHz and 10 kHz square wave tone for record phase compensation adjustments. Oscillator output levels are individually adjustable at the three sine wave frequencies. A front panel test input jack applies your own test/alignment signal to all inputs.

A built-in diagnostic program detects faults in the CPU, and LEDs indicate when the capstan and reel servo systems are operating properly. Each circuit board is locally regulated, and front panel LEDS on the power supply confirm the presence of the various secondary voltages. (There is also a "ready" light indicating the audio output is unmuted following a brief delay for transient noise suppression).

Ergonomics ("human engineering") are an integral part of the MTR-10's design. Not only are the features user-oriented, such as the ability to "rock reels" with a cue lever or directly by hand, but so is the physical layout of the machine. The most commonly used audio and electronic adjustments are easily accessible via front-panel trimmers, and, as already explained, can be preset for instant switchover between various tape formulations and operating speeds. Access to the underside of the transport is as easy as pressing in two buttons and lifting up. (For the MTR-12, the transport panel is lifted up after two levers on the sides of the panel are raised. Refer to Figure 2-2.) Access to the audio control/monitor panel is just as easy -- unscrew two knurled, trapped thumb screws, and the panel hinges down. In the standard configuration, the audio control/monitor panel is mounted just below the transport and angled upward so a sitting or standing operator can easily use the panel. An overbridge mounts the audio/monitor control panel above the transport for greater convenience when the operator is standing. There is adequate leg room in either configuration, for the operator to sit in front of the machine. A precision splicing block immediately in front of the head stack, and a soft, washable rubber wrist pad provide that "extra touch" of professional convenience.

The optional CB-109 Auto Locator plugs into the rear panel. The unit serves as a remote control, with a redundant tape location readout (which may be offset from the MTR-10), plus the tape motion controls and a pitch control. In addition, it has a locate time readout, and 10 keyboard assignable memories (five of which have direct store and search buttons for even faster editing or overdubbing work). Special features of the Auto Locator include a Shuttle button for repeating any desired segment of the tape, Auto Rewind (for returning to a cue and stopping), Search to Zero (really an 11th cue), and more.

When Remote control is desired without an Auto Locator, there are two units available. The CB-102 Remote Control Box has buttons for basic transport functions (Play, Stop, Rewind, F.Fwd. and Record) with a Record LED. The CB-111 is a more sophisticated Remote Control Box on which the basic transport function buttons are all illuminated (just like the buttons on the MTR-10); it also has Search Zero, Cue and Pitch Control functions.

A special low speed version is also offered ("L" suffix on number) which operates at 3.75, 7.5 and 15 ips instead of 7.5, 15 and 30 ips.

1.3 REFERENCE PHOTOGRAPHS

The following illustrations are overall-view photos of the MTR-10 and are provided for general reference purposes.

FIGURE 1-1. MTR-10-2 2-TRACK MASTERING/PRODUCTION TAPE RECORDER shown here with standard audio/monitor control panel location.

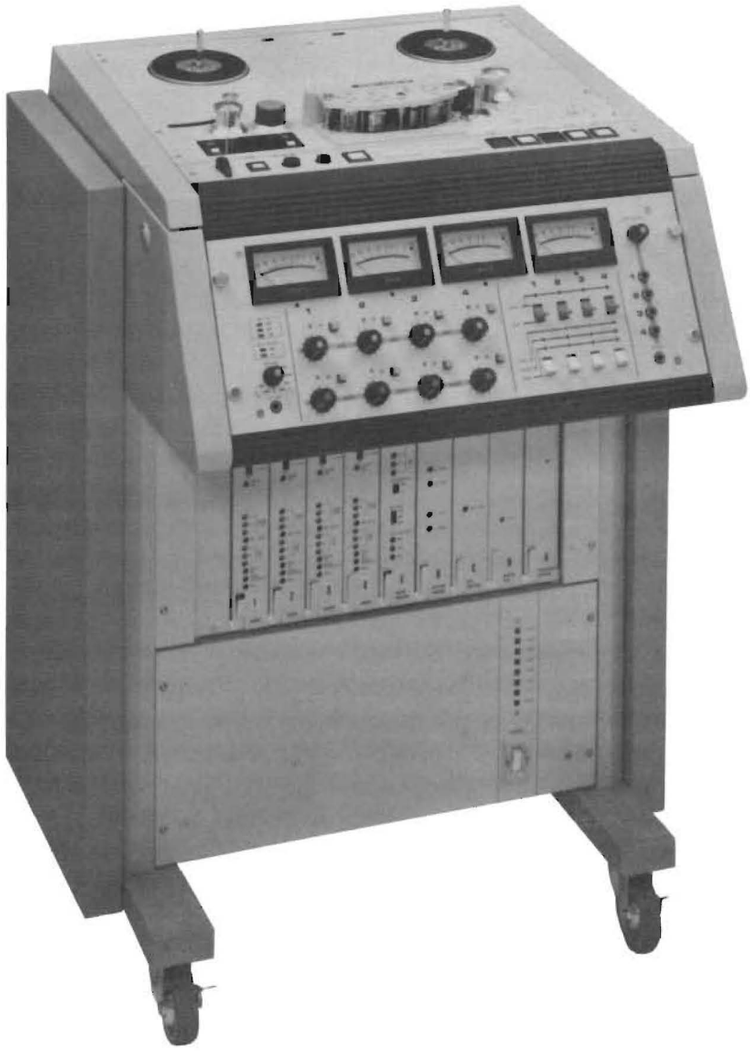


FIGURE 1-2. MTR-10-4 4-TRACK MASTERING/PRODUCTION TAPE RECORDER shown here with standard audio/monitor control panel location.

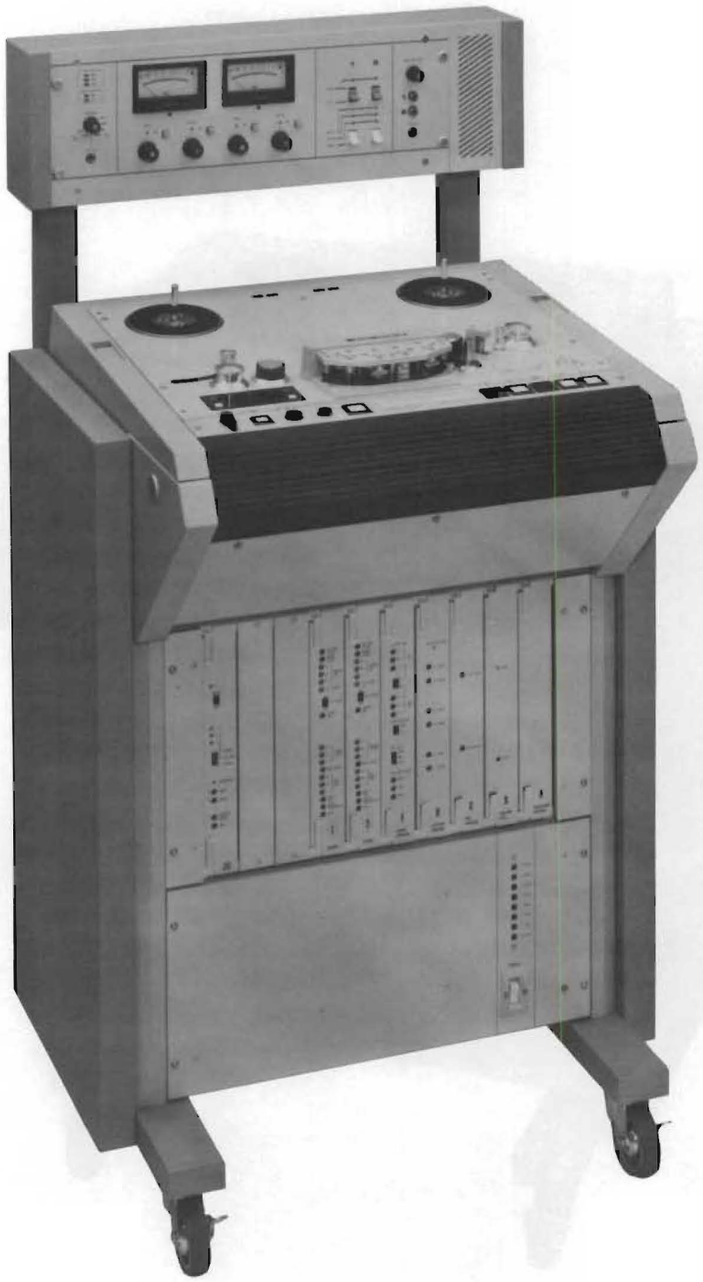


FIGURE 1-3. MTR-12-2 2-TRACK OVERBRIDGE CONFIGURATION MASTERING/ PRODUCTION TAPE RECORDER shown here with audio/minitor control panel on the overbridge assembly.

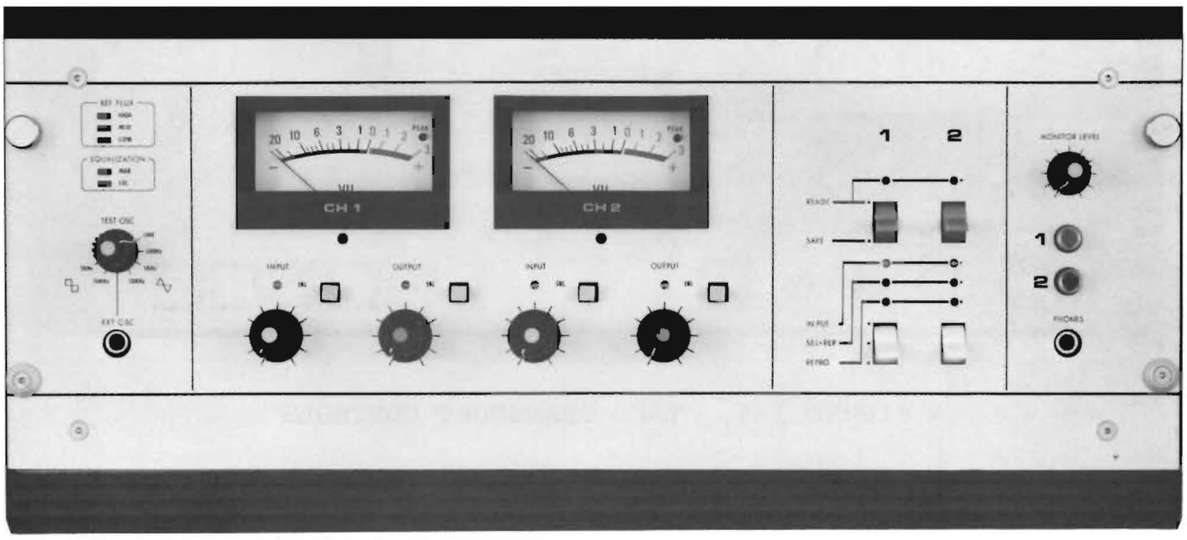


FIGURE 1-4. 2-CHANNEL AUDIO/MONITOR CONTROL PANEL

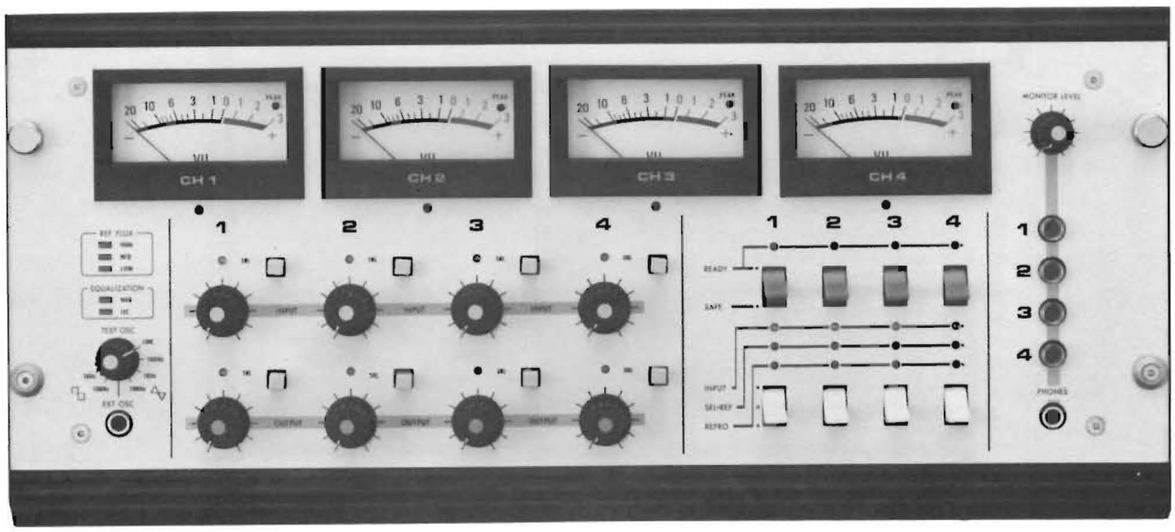


FIGURE 1-5. 4-CHANNEL AUDIO/MONITOR CONTROL PANEL

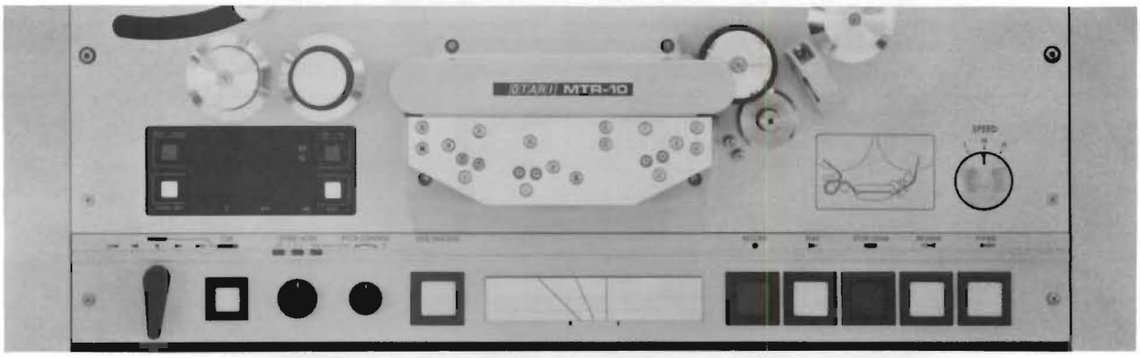


FIGURE 1-6. TAPE TRANSPORT CONTROLS

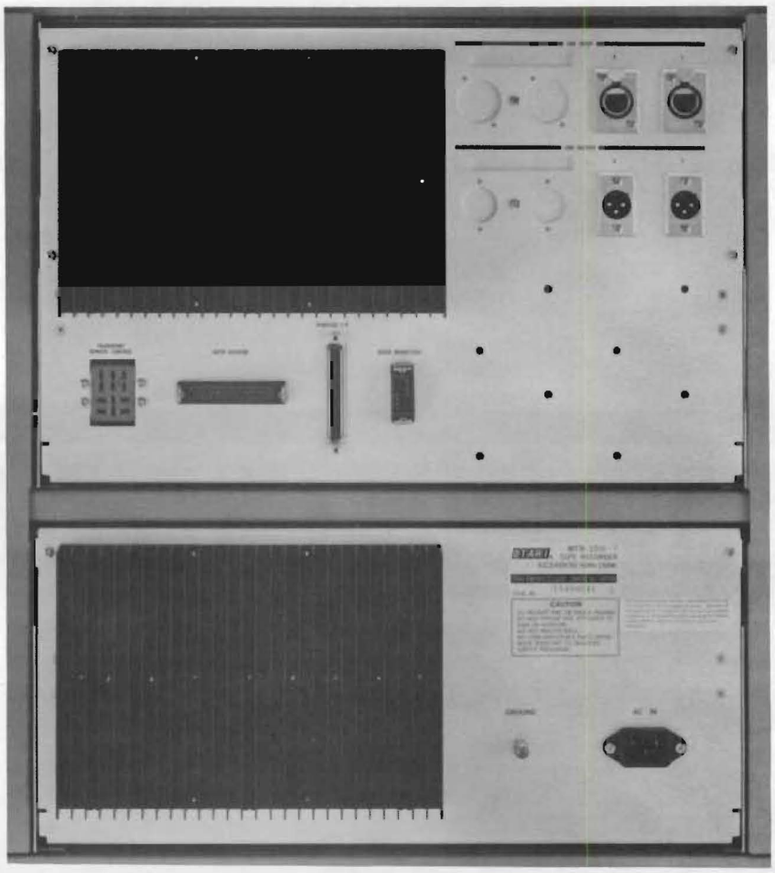


FIGURE 1-7. 2-CHANNEL REAR PANEL CONNECTORS

Includes Audio Input and Output, Auto Locator, Remote Control, External Sync, and Noise Reduction switching functions. The 4-channel rear panel is similar, with two extra Line Inputs and Outputs.

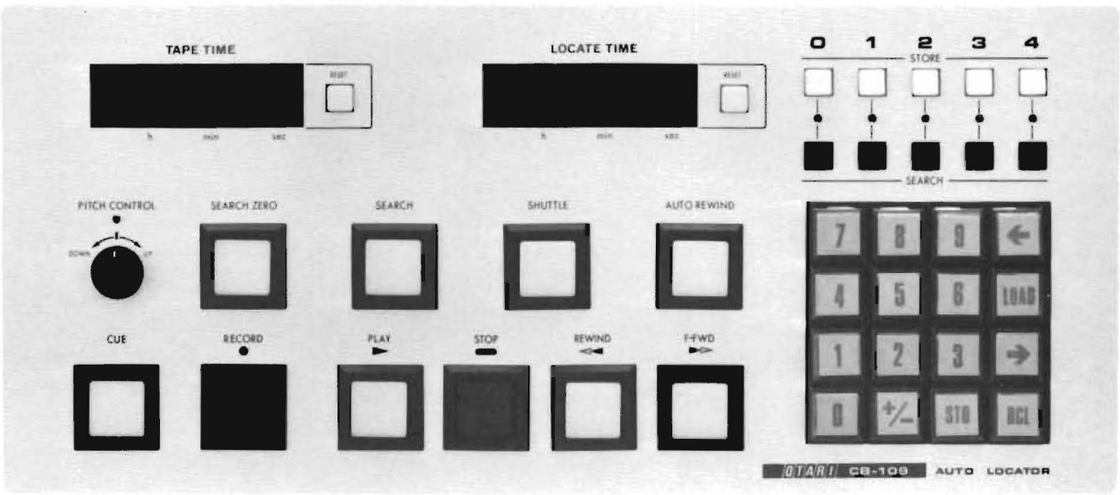


FIGURE 1-8. CB-109 AUTO LOCATOR

FIGURE 1-9. CB-102 REMOTE CONTROL BOX

FIGURE 1-10. CB-111 REMOTE CONTROL BOX

2

SECTION 2

INSTALLATION

2.1 PRELIMINARY

MTR-10 Recorders are shipped fully assembled (including casters) on a wood pallet, with a heavy cardboard carton containing a form-fitting foam packing insert surrounding the machine, strapped to the pallet. A separate box inside the main carton contains the reel hold downs, a takeup reel, an AC power cord, a pair of Otari Reel Adjusting Disks to raise thin or warped reels, spare lamp assemblies for control buttons, male and female 20-pin unwired connectors for wiring to cables from a synchronizer and from a noise reduction system's switching logic, and self-adhesive numbers for labeling audio boards.

We recommend opening the outer carton carefully, lifting it off, and saving all packing materials at least until proper MTR-10 operation has been verified.

NOTE: The MTR-10 weighs approximately 155 pounds (70 kg) exclusive of the packing materials and accessories, and 230 pounds (105 kg) in the shipping crate. Unless you are strong and in good physical condition, it is advisable to seek an assistant when initially unpacking and setting up the recorder to avoid physical strain and to ensure gentle handling of the equipment.

2.2 INSPECTION

Before you make any electrical connections, the equipment should be inspected visually. If there is any evidence of damage due to rough handling in shipping, it is your responsibility to notify the carrier and submit a claim. Do not connect or attempt to use the MTR-10 and accessories until you have made this inspection.

1. Inspect the equipment for any parts which may have become loosened or damaged during shipping.

2. Check the card cage. It should contain the following circuit boards (from right to left):

   A. TRANSPORT CONTROL board
   B. MASTER CPU board
   C. REEL CONTROL board
   D. CAPSTAN CONTROL board
   E. AUDIO CONTROL board
   F. The proper quantity of AUDIO boards (i.e., 2 or 4).
   G. Blank panels in the remaining unused positions.

3. The lower portion of the machine should contain the Power Supply (a large blank front panel) and, to its right, the Power Control panel with On/Off switch and status indicator lamps.

4. Grasp the innermost edges of the white extractor tabs at the top and bottom of the #1 AUDIO board (not AUDIO CONTROL) and pull outward to extract the board from the card frame. Check the UNBAL/BAL switch (SW2) at the top edge near the rear of the board. If the line output is to be connected to a balanced or floating input, make sure the switch is in BAL position (slide upward). If it is to be connected to an unbalanced input, slide the switch to UBNAL position (toward the bottom of the board) to ground the low side of the XLR connector. When reinstalling the board, use care to fit the green circuit card itself in the upper and lower guides of the card frame, and press in firmly on the upper and lower extractor tabs so the board's rear edge connector seats fully into the female connector on the motherboard in the card frame.

   Repeat this step for the remainging AUDIO board(s).

   NOTE: While the balanced output will function into an unbalanced load, providing this internal grounding will minimize the chance of hum.

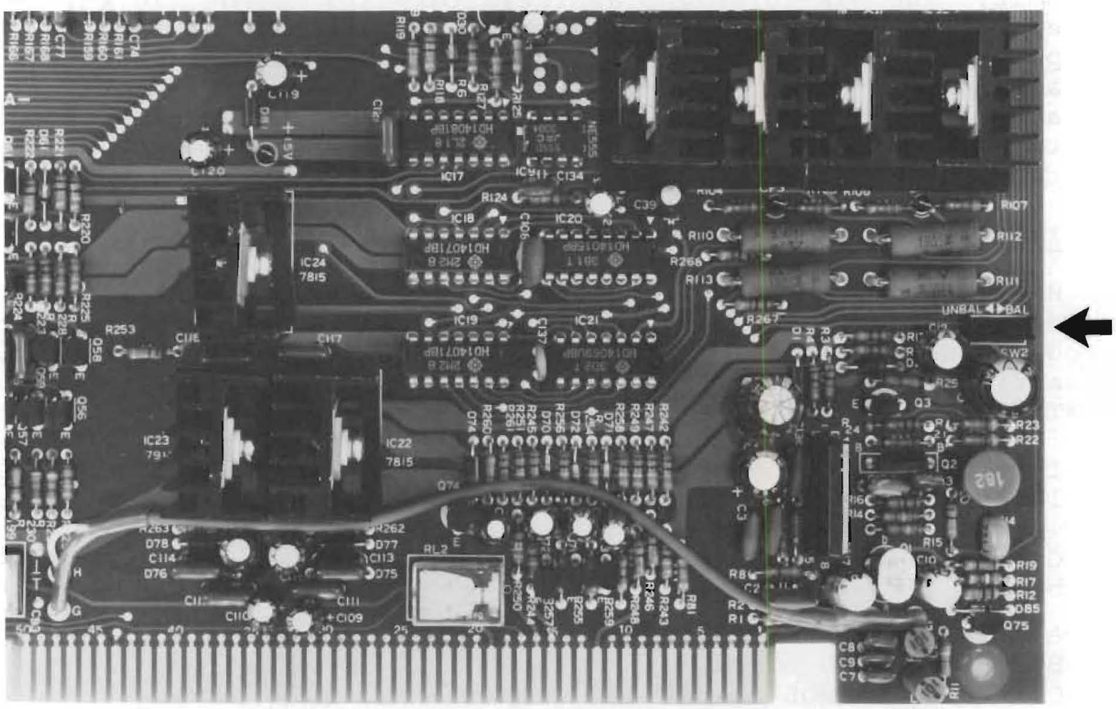


FIGURE 2-1. BAL/UNBAL OUTPUT LOAD SELECTOR SWITCH (SW2) ON AUDIO BOARD

5. Make sure each board in the upper card cage is all the way "home" in its socket on the mother board by pressing in firmly and simultaneously on both white extractor tabs.

6. From the front of the machine, check the connectors and components beneath the MTR-10 transport as follows:

   A. Press in on the two buttons on the right and left side of the chassis near the front of the transport. The transport will "pop up" a half inch or so. Lift it from there to vertical position, and let it back down gradually; latching supports should "lock" it into nearly vertical position, at which point you may release your grip.

      The MTR-12 has no such buttons. Two levers, one on each side of the transport panel, provide the same function as the buttons. These levers are shown in Fig. 2-2. If the levers are pulled upward the transport will "pop up" a half inch or so. The transport can then be opened in the same way as the MTR-10.

   B. Check the various connectors below the transport to be sure they are firmly mated: (Refer to figure 2-3.)

      1. The connector below the transport control buttons (STOP/LOAD, PLAY, REWIND, F.FWD AND RECORD).

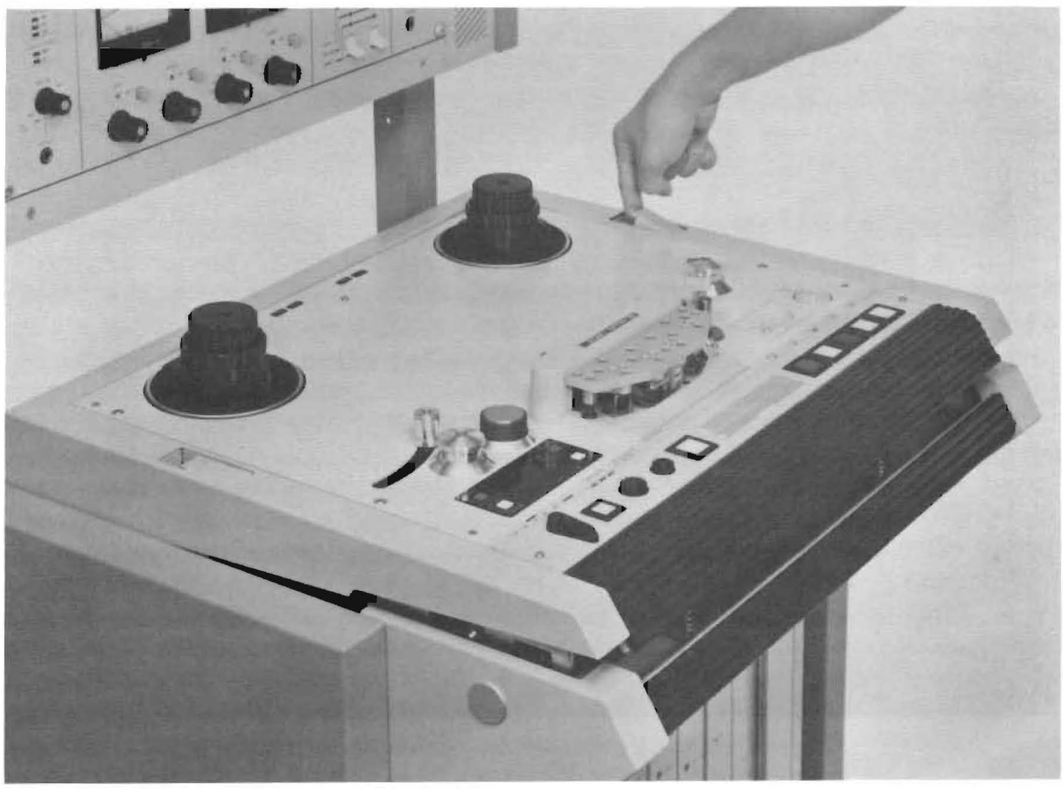


FIGURE 2-2. MTR-12 TRANSPORT PANEL RELEASE LEVER

2. The 3 connectors located in the vicinity of the EDIT/ UNLOAD button, CUE button, SPEED MODE switch and PITCH CONTROL.

3. The 4 connectors at the bottom edge of the pair of small circuit boards beneath the LED time readout.

4. The connector on the tachometer circuit board (adjacent to the tachometer roller on the supply reel side of the transport).

5. The in-line connector near the top of each reel motor.

6. The connector on the rotational sensor/brake circuit board in the metal cage at the bottom of each reel motor.

7. The 3 connectors on each of the two circuit boards between

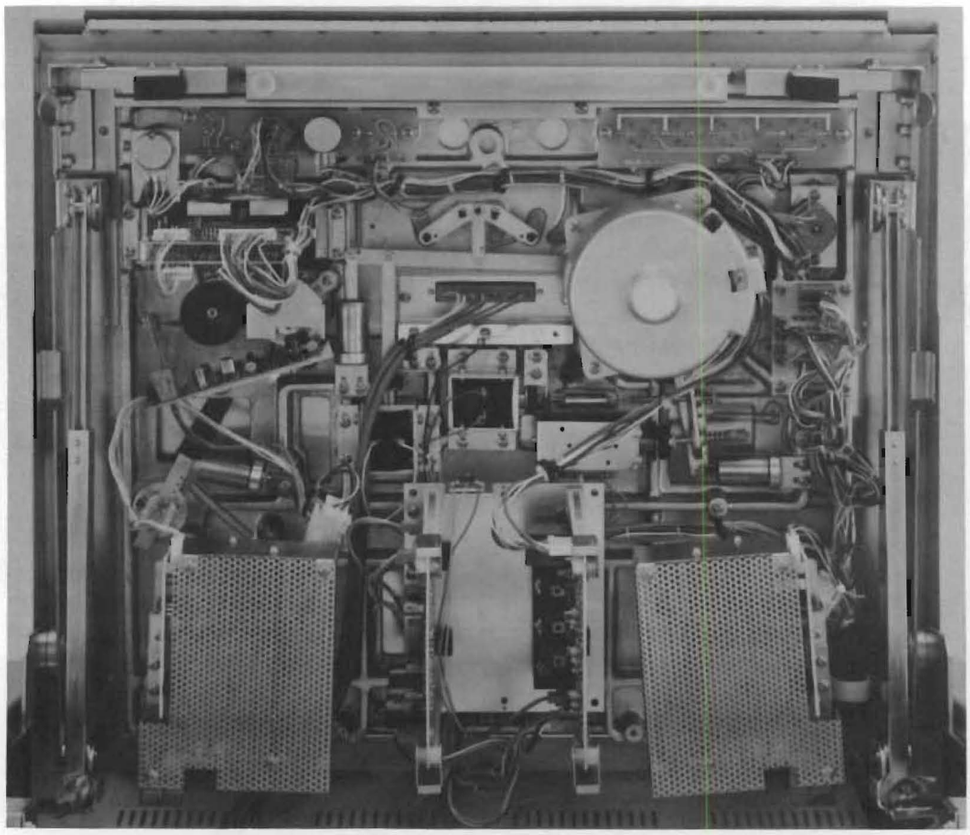


FIGURE 2-3. MAKE SURE THE CABLE CONNECTORS BENEATH THE TRANSPORT ARE SECURELY MATED TO THE CIRCUIT BOARD CONNECTORS

the reel motors. (NOTE: on the board nearer to the supply reel motor, there is a fourth connector which has no cable attached to it.)

8. The connector on the sensor switch assembly immediately to the right of the capstan motor.

9. The 7 connectors on the junction circuit board to the right of the capstan motor and just below the SPEED switch.

C. Check for any obviously loose or damaged components, and any cut or broken wires, including the leads from the head assembly connector.

D. Lift the transport up to fully vertical position, which will release the latches, then let it down to horizontal position and press on the rubber wrist pad so the unit locks in place.

7. From the front of the machine, check the components behind the audio/monitor control panel assembly as follows (Refer to figure 2-4):

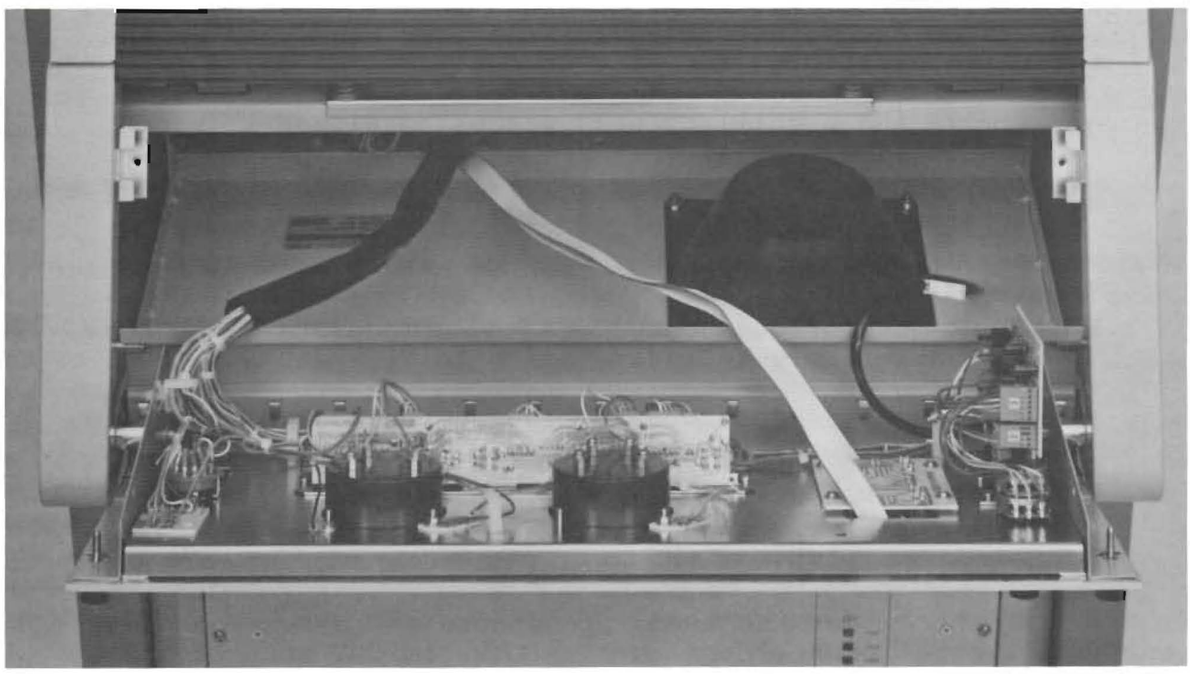


FIGURE 2-4. MAKE SURE THE CABLE CONNECTORS AND LEADS ARE SECURELY MATED TO COMPONENTS BEHIND THE AUDIO/MONITOR CONTROL PANEL (MTR-10-2 standard console model shown here)

A. Turn the two knurled thumb-screws at the top of this panel counterclockwise to release the panel, and tilt the panel down (it will stop in the horizontal position). Retaining clips should keep the screws from falling out of the panel.

B. Check the various connectors on the panel, including:

1. The connectors on the circuit board just below the VU meters. There are 6 on the MTR-10-2 and 8 on the MTR-10-4.

2. The 5 connectors on the circuit board behind the MONITOR LEVEL pot and PHONES jack.

3. The in-line connector on the cable from the PHONES jack to the cue speaker.

C. Check for any obviously loose or damaged components, and any cut or broken wires, including the leads to each meter, potentiometer, LED and switch.

D. Close the panel and secure it with the two knurled thumb-screws.

8. From the rear of the machine, check the connectors and components on the mother board for the card cage, and on the interface panel with the Line In/Out XLR's on it.

A. Remove the 2 phillips head screws on either side of the interface panel that are nearest to the top of that panel. The panel will now swing down on a hinge and will stop in the horizontal position. NOTE: Do not remove the screws adjacent to any connectors or the two closely-spaced pair of screws on either side of the panel.

B. Check the various connectors and components to be sure they are firmly seated: (Refer to Figure 2-5.)

1. The many connectors located on the back of the card cage's mother board.

NOTE: On the MTR-10-2, this board does not cover the space behind the blank front panels (about 5 inches on the right of the chassis).

2. Check that the leads are secure to the various interface panel connectors, such as LINE IN/OUT XLRs (1 & 2 or 1-4), EXT. SYNC, NOISE REDUCTION, and REMOTE BOX.

3. Check that the 3 leads are secure to each of the two power transistors on the large heat sink on the interface panel.

C. Look around for any obviously loose or damaged components, and any cut or broken wires. Then swing the panel up to closed position and secure it with the 4 phillips head screws.

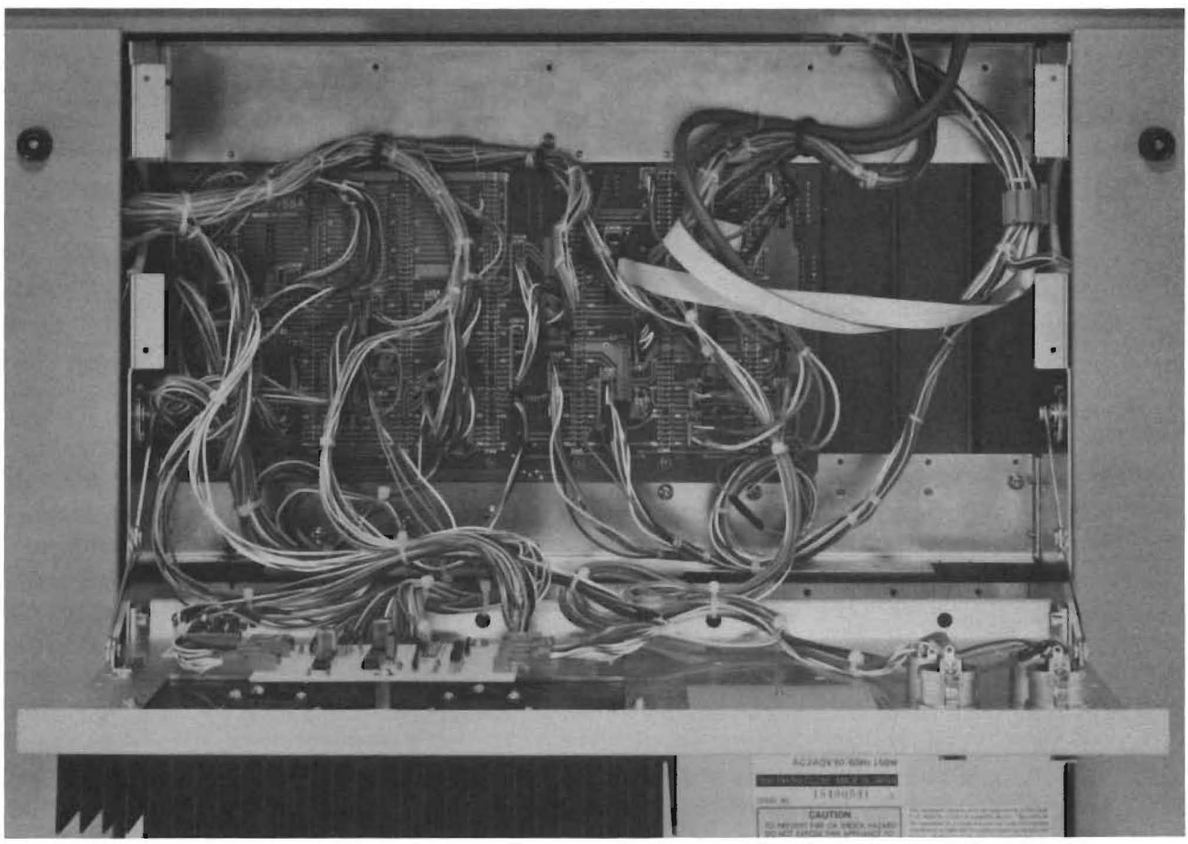


FIGURE 2-5. CHECK THE VARIOUS CONNECTORS AND COMPONENTS ON THE UPPER CARD CAGE MOTHER BOARD, AND THE INTERFACE PANEL BEHIND IT.

9. From the rear of the machine, check the connectors and components on the power supply/regulator board, and on the lower rear panel (with the AC IN connector).

   CAUTION: Be sure the AC power cable is not connected to the MTR-10 at this time.

   A. Remove the 2 phillips head screws at the upper corners of the panel with the POWER connector on it. The panel will now swing down on a hinge and will stop in the

horizontal position. NOTE: Do not remove the screws adjacent to the POWER connector or the two closely-spaced pair of screws on either side of the panel.

B. Check the various connectors and components to be sure they are firmly seated: (Refer to Figure 2-6.)

1. Check the many connectors on the power supply board itself.

2. Visually inspect the 6 fuses on that board to verify they are fully inserted in their mounting clips, and that the fuse wires appear to be intact.

3. Check the four push-on terminals on each of the two full wave rectifiers on the heat sink on the rear panel.

4. Check that the 3 leads are secure to each of the three power transistors on the heat sink on the rear panel.

5. Check that the 3 leads are secure to the AC IN connector on the rear panel.

6. Check that the two leads to the ground lug on the rear panel are intact, and also the two leads to the ground lug on the bottom mounting rail to the right of the power supply circuit board.

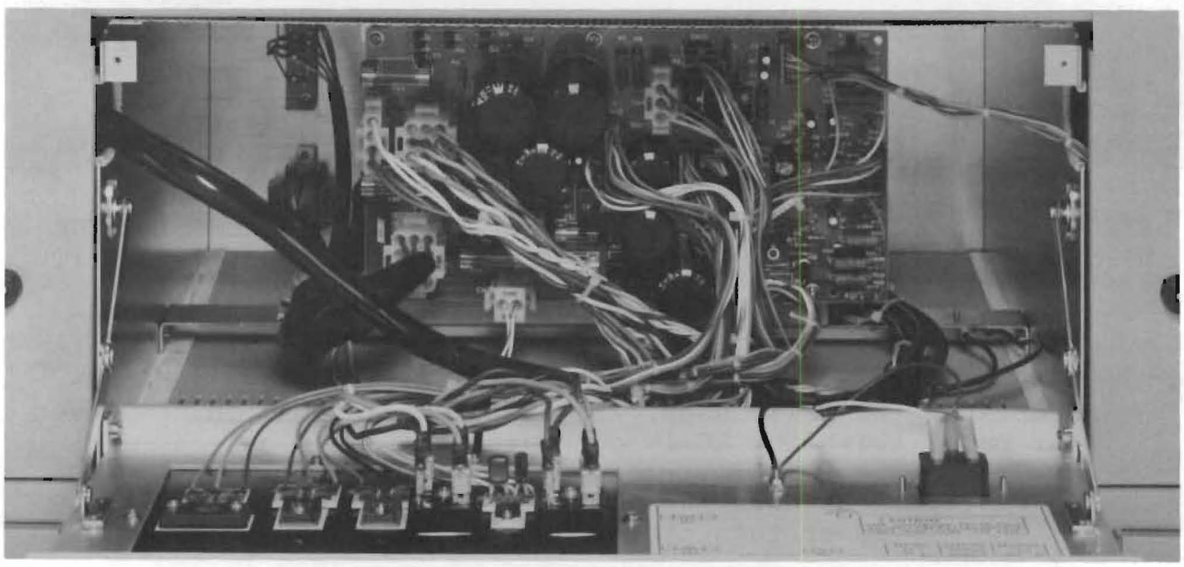


FIGURE 2-6. CHECK THE VARIOUS CONNECTORS AND COMPONENTS ON THE POWER SUPPLY CIRCUIT BOARD AND THE LOWER REAR PANEL.

C. Look around for any obviously loose or damaged components, and any cut or broken wires. Then swing the panel up to closed position and secure it with the 2 phillips head screws.

10. If minor faults or discrepancies are noted during the foregoing inspection procedures, make the necessary corrections or adjustments, and proceed with installation.

IMPORTANT NOTE: If serious problems are apparently caused by shipping damage, whether concealed or obvious, you must file a claim with the delivering airline, freight line or other carrier. You also must notify Otari or the nearest Otari representative. Retain all packing materials for evidence in damage claims. Failure to do so may weaken your claim! To replace any parts under warranty, obtain from Otari or its representative a return authorization form. DO NOT ATTEMPT TO APPLY POWER OR OPERATE THE MACHINE UNTIL PROPER REPAIRS HAVE BEEN COMPLETED.

2.3 FUNCTION SELECTION ON MASTER CPU P.C.B. ASSEMBLY

There are some function selection switches on the Master CPU P.C.B. assembly (PB-4GEA). Set those switches to the proper positions according to the function which you desire as following.

* mark indicates the position of factory presetting.

SW1 : CPU Reset switch

SW2-1 : Output Mute on Stop mode

On	Output is muted on Stop mode.
*Off	Output is not muted on Stop mode.

SW2-2 : Output Mute on Fast Wind mode

On	Output is muted on Fast Wind mode.
*Off	Output is not muted on Fast Wind mode.

SW2-3 : Output Mute on Play Start Time

On	Output is muted on Play Start Time.
*Off	Output is not muted on Play Start Time.

SW2-4 ∿ 8: Not used.

SW3-1 : Speed Selection for Library Wind

*On	Standard Library Wind Speed
Off	Lower Library Wind Speed

SW3-2 : Reel type Selection

On	DIN type
*Off	NAB type

SW3-3 : Back Erase mode selection

On	Back Erase mode is available.
*Off	Back Erase mode is inhibited.

SW3-4 : Back Play mode selection

*On	Back Play mode is available.
Off	Back Play mode is inhibited.

SW3-5 : Slow Down function selection for Rewind mode smaller reels than 10 inch

On	No deceleration at the tape end
Off	Deceleration at the tape end with smaller reels than 10 inch

(*On = MTR-10) (*Off = MTR-12)

SW3-6 ∿ 8: Not used

SW4-1 : Not used

SW4-2 : Dump Edit mode selection

*On	Transport will get in Dump Edit mode when tension arm is released.
Off	Transport will stop when tension arm is released.

SW4-3 : Pitch Control mode selection on Record mode

On	Pitch Control mode can be selected on Record mode.
*Off	Pitch Control mode can not be selected on Record mode.

SW4-4 : Stop mode selection

On	Play mode will continue even when Play and Stop buttons are pressed simultaneously.
*Off	Transport will stop when both buttons are pressed simultaneously.

2.4 CONNECTIONS

Basic hookup of the MTR-10 has been made as simple as possible. The machine itself comes fully wired. Standard 3-pin XLR connectors make it easy to attach cables from the LINE IN and LINE OUT to your sound system. If a Remote Box or Auto Locator is being used, only a single cable is required from either unit to the MTR-10. If a noise reduction system is being used, the encode/bypass/decode switching may be done manually, or it may be done via contact closures on the MTR-10 NOISE REDUCTION connector. If a multi-machine controller or synchronizer is used, two cables are connected (one to the MTR-10 EXT SYNC. connector, and one to the REMOTE BOX connector). The overall hookup scheme is pictured in figure 2-8.

2.4.1 LINE INPUT AND LINE OUTPUT

Connect the buss outputs from your console to the MTR-10 LINE INPUTs (20 kohms load impedance, transformerless balanced or floating with optional transformers), and connect the MTR-10 LINE OUTPUTs (<5 ohms source impedance, transformerless balanced or floating with optional transformers) to the line inputs of your console. To avoid hum-inducing ground loops, be sure to follow a sensible grounding scheme, such as telescoping shields (connect shield at outputs, cut shield at inputs of each piece of equipment), or a single, common ground point (connect shields at console, not at tape machine, and run a single ground wire from the MTR-10 GROUND terminal back to the console. 600 Ohm termination of the MTR-10 is not necessary.

NOTE: Audio connections are made via 2-conductor shielded cables with 3-pin XLR-type connectors. These cables are not provided with the MTR-10, but are commonly available (standard professional microphone cables) or may be wired as shown in figure 2-6.

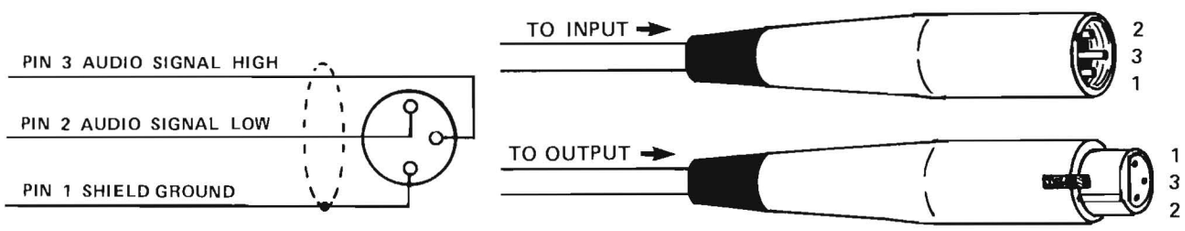


FIGURE 2-6. XLR CABLE WIRING FOR AUDIO CONNECTIONS

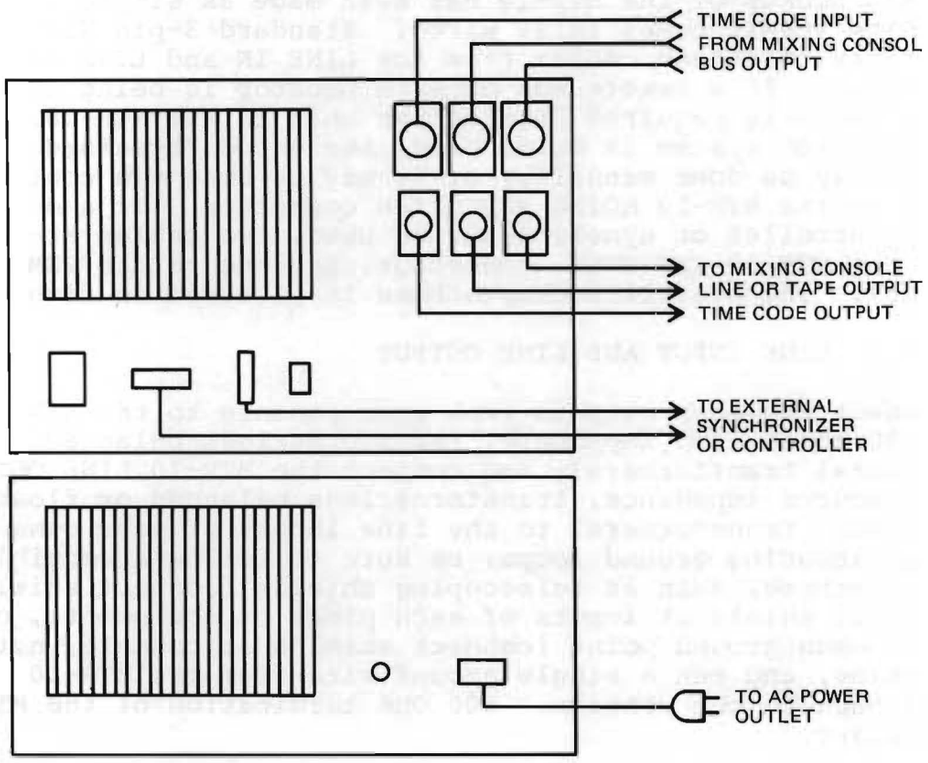


FIGURE 2-7. AUDIO, POWER AND EXTERNAL CONTROL/SYNC CONNECTIONS.

2.4.2 INTERCONNECT CABLE FOR OPTIONAL AUTO LOCATOR

A cable is supplied with the optional CB-109 Auto Locator, and has a 50-pin 'D' connector on each end. Insert the male end of this cable into the MTR-10 AUTO LOCATOR connector, and the female end into the connector on the rear of the CB-109 Auto Locator. The cable connectors have a pair of spring-loaded tabs, one on each side, that must be squeezed together when disconnecting the cable.

The tabs automatically snap into place when pushing the cable connector into the chassis connector. When mating connectors, align them carefully to avoid any chance of bending the pins. (Additional details are in Section 7.)

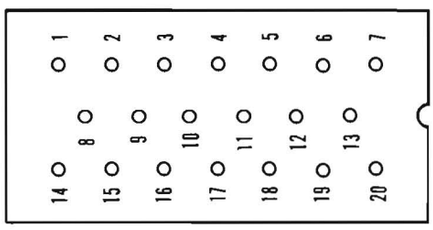
2.4.3 INTERCONNECT CABLE FOR OPTIONAL REMOTE CONTROL BOX

A cable with a male 12-pin connector is supplied with either of the two different Otari Remote Control Boxes available for use with the MTR-10. That cable should be connected to the TRANSPORT REMOTE CONTROL connector on the MTR-10 rear panel.

2.4.4 REMOTE MODE SWITCHING FOR NOISE REDUCTION EQUIPMENT

If you are using Dolby™ or other noise reduction equipment, it can be automatically and remotely switched between encode and decode mode by means of a 20-pin connector on the MTR-10 (mates with the HK MR-20 LW connector supplied with the machine). See figure 2-9 for pin assignment of this logic connector. One pair of relay contacts per channel is provided, and they close (make contact) when the channel is in Input or Record mode. The contacts are rated at 24 volts DC, 50 milliamperes.

CHANNEL	PIN NUMBERS	NOTES
1	1 & 2	(Used on MTR-10-2 or MTR-10-4)
2	3 & 4	"
3	11 & 12	(Not used on MTR-10-2)
4	13 & 14	"



(Wiring Side)

FIGURE 2-9. NOISE REDUCTION CONNECTOR PIN ASSIGNMENT

2.4.5 PARALLEL I/O CONNECTOR

When the MTR-10 SPEED MODE switch is set to EXT position, the capstan motor speed is controllable by an external reference signal. The signal is applied via the connector, PARALLEL I/O on the rear of the machine. Specifically, the external clock reference frequency is 9,600 Hz (nominal value for the set 7.5 ips, 15 ips or 30 ips speed selected). The reference signal should be at TTL level with a 50% duty cycle (i.e., a square wave that is 0 volts

when off, +5 volts when on). If necessary, a sine wave signal may be used, provided it is approximately 10 volts peak-to-peak in amplitude and has a low source impedance. As an alternative, the capstan speed can be varied by a DC signal (or an external potentiometer) via the MTR-10 AUTO LOCATOR input. The MTR-10 will automatically sense the presence of the constant voltage or reference frequency, and will respond properly in either case, so long as the SPEED MODE switch is in EXT. position.

To use an SMPTE synchronizer, such as the BTX SHADOW, AUDIO KINETICS "Q-LOCK" system, ADAMS-SMITH, or a controller, the same PARALLEL I/O connector is employed. Additional details of synchronizer connection and operation are given in Section 6.15.

2.4.6 AC POWER CONNECTION

The MTR-10 rear panel has a 3-pin standard IEC power connector labeled AC IN. A 3-prong (grounded) AC cord with mating connector is provided with the MTR-10.

CAUTION

Do not plug the power cable into the AC mains until you first verify that the actual mains voltage (and frequency) meets that specified for the MTR-10, as labeled on its rear panel. Also, do not plug in the power cord until you check to make sure the MTR-10 POWER switch is turned Off. This rocker switch is located on the power supply front panel, at the lower right-hand corner of the machine. It is Off when the lower half of the switch is pressed in.

Refer to Section 3.1 for powering up the unit.

3

SECTION 3

FUNCTIONAL CHECKOUT AND BASIC OPERATION

3.1 GENERAL

After the MTR-10 has been checked for shipping damage, the audio (and applicable remote) cables have been connected as indicated in Section 2, and the mains voltage has been checked to see that it corresponds with the rated voltage of your MTR-10, the system is ready for initial powering up and a check out of transport functions. This section of the manual describes the checkout, which also serves to familiarize the reader with the basic operation of the machine (detailed further in Section 6 of this manual). Section 3.7 provides brief descriptions of each MTR-10 control and indicator.

NOTE: If any function seems to be abnormal, first check the cables and recheck your procedures. Then contact your nearest Otari representative or the Otari customer service department for assistance.

CAUTION

If any internal or rear-panel logic cable (e.g., EXT. SYNC or AUTO LOCATOR) is disconnected and then reconnected while power is On, or if certain circuit boards are unplugged and then plugged back in, the MTR-10 may not function properly. To clear the condition, turn Off power and wait 1 minute for the power supply capacitors to discharge sufficiently for circuits to reset (until all front-panel power supply lamps have been off at least 30 seconds). Then turn power On and normal operation should be restored.

3.2 MTR-10 CONTROLS AND INDICATORS: QUICK REFERENCE GUIDE

Figures 3-1 and 3-2 illustrate the externally accessible controls and indicators on the MTR-10-2. The MTR-10-4 is not shown, but is nearly identical; it has four sets of audio controls, switches, meters and AUDIO boards instead of two. The various features are identified by numbered callouts, which are keyed to brief descriptions. Additionally, in other portions of Section 3, the text also refers to the numbered features in these two illustrations; when such references are made, the feature number is cited in square brackets. For example, "press the STOP/LOAD button [6]."

The brief descriptions in Section 3.2 are intended more as reminders for someone who is already familiar with the machine than as complete operating instructions.

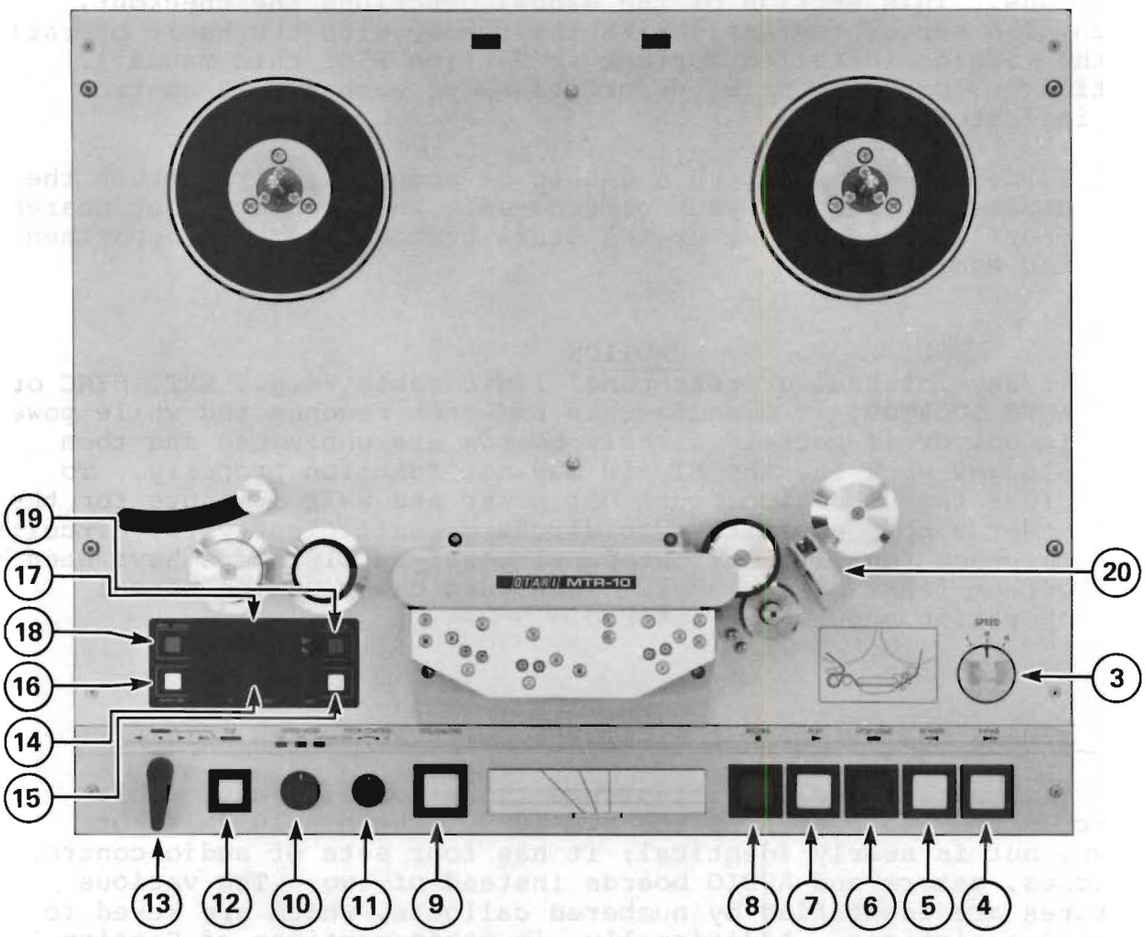


FIGURE 3-1. MTR-10 TRANSPORT FEATURES
(Callout numbers are shared with the numbers in figure 3-2, and also are referred to in the text of this Section.)

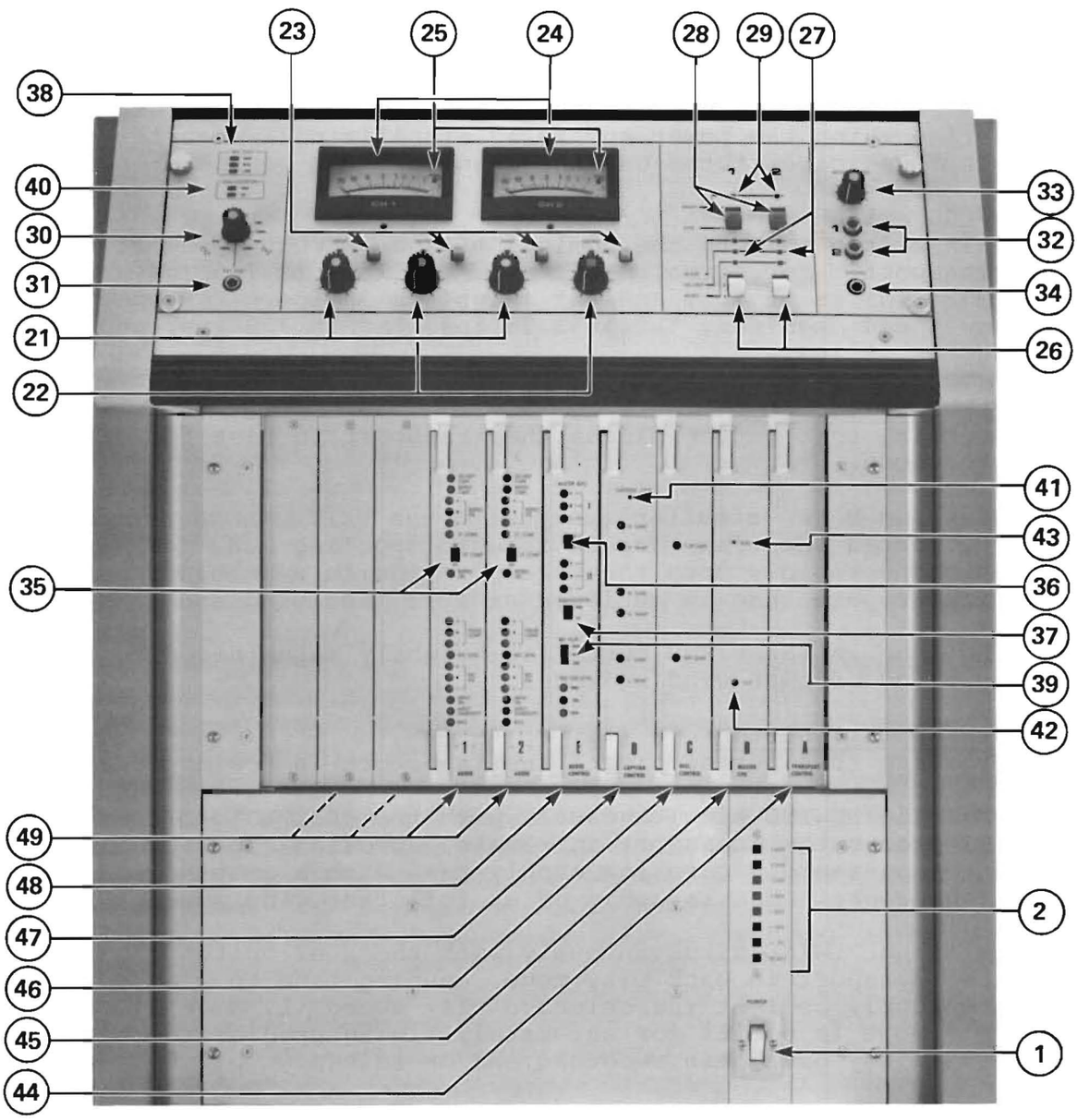


FIGURE 3-2. AUDIO/MONITOR CONTROL PANEL, CARD CAGE AND POWER SUPPLY FEATURES
(Callout numbers are shared with the numbers in figure 3-1, and also are referred to in the text of this Section.)

1. POWER switch
This is the main power switch for all electronics and the transport.

2. Power supply indicators
These LEDs turn On when the POWER switch is On, indicating the various secondary voltages are present. The READY indicator nearest the POWER switch does not turn On for a few seconds, during which the power supply is stabilizing. When the READY indicator turns On, the transport can be operated.

3. SPEED switch
This switch selects the nominal PLAY or RECORD speed of the transport. For normal machines, "L" (low) is 7.5 ips, "M" (mid) is 15 ips, and "H" (high) is 30 ips. For special low speed machines, "L" is 3.75 ips, "M" is 7.5 ips, and "H" is 15 ips.

4. F.FWD (>>) button
Pressing this button places the transport in fast forward wind mode.

Pressing F.FWD simultaneously with the EDIT/UNLOAD button [9] places the transport in forward spooling mode for winding tape rapidly onto the takeup reel with a smoother and tighter pack than is achieved at full fast wind speed.

The lamp in the F.FWD button is brightly illuminated in spooling or fast winding modes.

5. REWIND (<<) button
Pressing this button places the transport in rewind mode.

Pressing REWIND simultaneously with the EDIT/UNLOAD button [9] places the transport in reverse spooling mode for winding tape rapidly onto the supply reel with a smoother and tighter pack than is achieved at full fast wind speed.

Pressing REWIND simultaneously with the PLAY button [7] places the transport in back play mode, causing tape to wind onto the supply reel at the selected play speed (L, M or H). This mode is useful for accurately timing program segments after they have been recorded and/or edited.

The lamp in the REWIND button is brightly illuminated in spooling, rewind, or back play modes.

6. STOP/LOAD button
The lamp in this button flashes when the transport is in unload mode (as when tape is first threaded); in this case, pressing the STOP/LOAD button prepares the transport to move

(STOP/LOAD, continued)
tape; it releases the reel motor brakes, activates the servo system, and causes the pinch roller to move closer to the capstan. The button does not stop flashing until tape has been wound a few feet from one reel to the other, allowing the CPU to calibrate the servo system.

When the transport is in play, record, back play, fast forward, rewind or spooling mode, pressing STOP/LOAD causes the tape to stop; the lamp in the button is then brightly illuminated.

7. PLAY (>) button
Pressing this button places the transport in play mode, causing tape to wind at the selected speed (L, M or H) onto the takeup reel.

Pressing PLAY simultaneously with the REWIND button places the transport in back play mode (see REWIND, [5]).

Pressing PLAY when the transport is in edit mode (see EDIT/UNLOAD [9]) causes tape to play, but the takeup reel does not turn so tape will spill for "dump edits."

When the transport is in stop mode, pressing PLAY simultaneously with RECORD [8] causes the transport to enter record mode (one or more READY/SAFE switches [29] must be set to READY in order for recording to actually take place).

When the transport is in record mode, pressing PLAY causes the machine to stop recording, and to enter play mode.

The lamp in the PLAY button is brightly illuminated in play, back play, record, and dump edit modes.

8. RECORD button
When the transport is in stop mode, pressing the RECORD button simultaneously with the PLAY button [7] causes the transport to enter record mode.

When the transport is in play mode, pressing the RECORD button causes the transport to enter record mode.

In either of the above instances, the RECORD button will be brightly illuminated while the transport enters record mode, but one or more READY/SAFE switches [29] must be set to READY in order for recording to actually take place.

9. EDIT/UNLOAD button
Pressing this button places the transport in edit mode, which essentially shuts off the takeup reel motor. If the transport

is in play mode at the time, tape will spill off the transport as it passes the capstan. If the transport is in stop mode when EDIT/UNLOAD is pressed, the transport goes into edit ready mode (ready to dump edit when PLAY is pressed); then the supply reel motor also is uncoupled from the servo system so tape slack can be obtained without automatic back tension.

In edit ready mode, the lamp in the EDIT/UNLOAD button blinks brightly, as does the STOP/LOAD button lamp, and the line output is muted. In edit mode (dump edit), the PLAY and EDIT/UNLOAD lamps both are brightly illuminated, and the line output is not muted.

When the transport is in stop mode, pressing the EDIT/UNLOAD button twice places the transport in unload mode; the pinch roller moves further away from the capstan, and the reel motors are uncoupled from the servo system to allow for easier splicing and threading, and to allow a reel to be lifted from the machine without the tendency for the reel motor to spin freely. In this mode, the lamp in the EDIT/UNLOAD button remains dim, and the STOP/LOAD button lamp blinks.

To exit edit or unload mode, press the STOP/LOAD button [6].

Pressing the EDIT/UNLOAD button simultaneously with the F.FWD or REWIND buttons places the transport in forward or reverse spooling mode for winding tape rapidly onto the takeup or supply reels with a smoother and tighter pack than is achieved at full fast wind speed. The EDIT/UNLOAD and F.FWD or REWIND buttons will be brightly illuminated. Pressing the CUE button during this mode retracts the tape lifters. Spooling mode can be exited by pressing F.FWD, REWIND, PLAY or STOP.

10. SPEED MODE switch

This 3-position rotary switch selects the speed reference for the capstan motor. The selected position is indicated by one of three LEDs above the switch. The play/record speed is also affected by the SPEED switch [3].

EXT (amber light): Use this setting for controlling the pitch (play/record speed) with an external device such as the CB-109 Auto Locator's PITCH control, or the appropriate signal from a synchronizer; the available control range is ±20%.

When the auto locator is used, its pitch control adjusts the MTR-10 speed by means of a variable resistor connected across certain pins of the AUTO LOCATOR connector. When a synchronizer is used, it controls the pitch by means of a nominal 9,600 Hz control signal which is applied to certain pins of the PARALLEL I/O connector.

FIX (green light): Use this setting for precise, crystal controlled play/record speed; it is the "normal" setting.

VARI (amber light): Use this setting for controlling the pitch (play/record speed) with the MTR-10's PITCH control [11].

11. PITCH control
When the SPEED MODE switch [10] is in VARI position, this 5-turn knob controls the capstan motor speed over a range of approximately ±20%. The speed selected can be seen on the Tape Speed Display (refer to [17], [18] and [19]).

12. CUE button
The CUE button has several functions, depending on the transport mode when it is pressed, and whether other buttons are pressed at the same time.

By pressing the CUE button when the transport is in play, record or stop mode, cue mode is entered. In this mode, the tape speed and direction are continuously adjustable with the CUE lever [13], and the output can be monitored to "find a cue" on the tape. However, the output is muted 6 dB relative to play mode so that higher speed winding is less apt to damage monitor speakers with excess high frequency energy. In cue mode, the lamp in the CUE button is brightly illuminated. To exit cue mode, press STOP, PLAY, REWIND, F.FWD., or EDIT/UNLOAD.

Holding down the CUE button when the transport is in fast forward or rewind mode, retracts the tape lifters and unmutes the output (although the level is down 6 to 10 dB for protection) so that cues may be found during the high speed winding. When the CUE button is released, tape is again lifted from the heads and the line output is muted. The CUE button lamp remains dim in this mode.

13. CUE lever
When the transport is in cue mode (see [12]), this lever controls the speed and direction of tape travel. The farther to the right the lever is moved, the faster tape winds onto the takeup reel; left deflection causes winding onto the supply reel. The CUE lever is spring loaded to return to center (tape stopped) automatically.

14. Tape time display
This LED display indicates the elapsed tape time in hours, minutes and seconds. It is a true tape time readout based on the tachometer output and the set SPEED [3], and will read actual negative (minus) time if tape is rewound past the set zero point.

15. Tape timer RESET button
Pressing this button sets the tape timer at 0.00.00. It may be pressed when tape is in motion or stopped.

16. SEARCH ZERO button
Pressing this button causes the transport to enter zero search mode. Tape will fast wind in the appropriate direction, slow down, and stop when the tape time display [14] reads 0.00.00. (If the search was initiated from a positive time, the display will indicate -0.00.00 when tape stops; if initiated from a negative time, tape will park at 0.00.00.)

While the transport is in zero search mode, the F.FWD or REWIND button lamp will be illuminated (depending on the direction of tape travel), and the decimal point prior to the hours digit of the tape timer readout will flash (this decimal point is otherwise not illuminated). As tape approaches the zero point, the F.FWD and REWIND buttons will alternately flash as the reel motors are toggled to slow tape.

Search zero mode may be canceled by pressing the STOP, F.FWD or REWIND buttons. Pressing the PLAY button in this mode will cause the play button lamp to blink; then, upon reaching a tape time of 0.00.00, the transport will enter play mode.

17. Tape speed display
This display indicates the play/record tape speed in inches per second (ips) or as a percentage (%) of the speed set with the SPEED switch [3]. The display is blank until the adjacent SPEED DISPLAY button [18] is pressed.

NOTE: In the spooling, fast winding or cue modes, the tape speed display continues to indicate the speed that would be obtained in play or record mode, not the actual wind speed.

18. SPEED DISPLAY button
Pressing this button once turns Off the adjacent tape speed display. Pressing it again turns On the display.

19. "ips - %" button
When the MTR-10 is first turned On, the tape speed display shows the speed in inches per second. Pressing the "ips - %" button changes the display to percentage of set speed, and pressing it again changes back to ips. The selected display mode is indicated by a pair of LEDs adjacent to the "ips" and "%" labels on the tape speed display.

20. End of tape (safety) switch
This switch detects whether tape is threaded securely from the capstan onto the takeup reel. In the event of tape breakage, or excess slack, this switch is released, causing the transport to automatically enter the unload mode; power is removed from the reel motors, the mechanical reel brakes are applied to stop tape, and the pinch roller moves away from the capstan.

21. INPUT level controls
These controls set the levels of their respective channels' line inputs, and are used for recording level adjustments. Each INPUT level control is deactivated when the adjacent SRL button [23] is engaged.

22. OUTPUT level controls
These controls set the levels of their respective channels' line outputs, and are used for playback level adjustments. Each OUTPUT level control is deactivated when the adjacent SRL button [23] is engaged.

23. SRL buttons and indicators
One SRL (standard reference level) button is associated with each INPUT and OUTPUT level control. When the SRL button is engaged, the associated level control is bypassed, and an internal preset instead determines the level of that input or output circuit. An amber LED over the associated level control is illuminated in SRL mode. (The SRL levels are internally adjustable, as explained in Section 4.)

24. VU meters
These large, illuminated meters have standard VU ballistics and monitor the level of the MTR-10's correspondingly numbered line outputs. Since each output can be set to derive signal from the input or from tape, the meters are useful for monitoring input, sync and repro playback levels. The 0 VU reference is factory set at +4 dBm.

25. PEAK indicators
A red LED in the corner of each VU meter is driven by a peak level detection circuit. The LED monitors the same signal as the VU meter, but is more sensitive to brief transients which could go undetected by the slower VU ballistics. When monitoring input level, the PEAK indicator helps avoid excessive distortion; it is set to turn the LED On at the 3% THD point (i.e., the onset of tape saturation), but may be recalibrated as desired.

26. Output selector switches, and
27. Monitor indicators
One 3-position lever switch per channel determines the signal source which feeds the MTR-10 line outputs. Each switch selects the signal which feeds the channel's VU meter, PEAK indicator, and the headphone/ cue speaker assign button. A set of 3 monitor LEDs above each switch (INPUT, SEL-REP, REPRO) indicate which source is feeding the associated output.

The following table explains the switch and indicator function. Note that the output, in SEL-REP mode, will change depending on the record or non-record status of the transport.

SELECTOR SWITCH POSITION	TRANSPORT STATUS	MONITOR LED ILLUMINATED (& source of line output)
INPUT	Any mode	INPUT (the line input)
SEL-REP	Record mode	INPUT (the line input)
	Safe, Ready	SEL-REP (playback from the record head)
REPRO	Any mode	REPRO (playback from the reproduce head)

28. Record mode switches (READY/SAFE), and
29. Record mode indicators

One 2-position lever switch per channel determines whether the track is READY or SAFE from recording. With the switch up, the channel is in record READY mode, and recording will take place if the transport RECORD and PLAY buttons are or have already been pressed. With the switch down, the channel is in SAFE mode, and recording will not take place regardless of the RECORD and READY mode.

The following table explains relationships between the LED indicators, the transport mode and the record mode switches.

SELECTOR SWITCH POSITION	TRANSPORT STATUS	RECORD MODE LED ABOVE THE SELECTOR SWITCH
SAFE	Not in record mode	Not illuminated (dark)
	In Record mode	Blinks On and Off
READY	Not in record mode	Blinks On and Off
	In Record mode	Remains illuminated (On)

30. TEST OSC switch,and
31. EXT OSC jack

The TEST OSCILLATOR switch determines the signal applied to the input of all channels; it may be the normal line input, an external test oscillator input, or several test signals from a built-in oscillator.

In LINE position, the rear-panel LINE INPUT XLR connectors supply the signal source. This is used for normal operation.

In EXT OSC position, the phone jack below the switch accepts an external line-level signal (as from a test oscillator) and slates it across all input channels; when nothing is plugged into the jack, this position can be used to mute the inputs.

There are five additional switch positions: 100 Hz, 1 kHz and 10 kHz sine wave, plus 1kHz or 10 kHz square wave. Setting the switch to any of these positions turns on the MTR-10's oscillator and slates the tone across all channels.

32. Monitor selector buttons
These buttons are numbered to correspond to channels 1 & 2 on the MTR-10-2 or channels 1 - 4 on the MTR-10-4. Pressing in a button feeds the corresponding channel's output to the headphone circuit, or to the cue speaker if headphones are not plugged in. The signals are always "mono" at the cue speaker, but the headphone signal may differ.

In the MTR-10-4, the signals are always "center mono" in the headphones (i.e., the same signal is fed to both earpieces at equal level). In the MTR-10-2, channels 1 and 2 are fed, respectively, to the left and right earpieces of the headphones when both buttons are engaged (for stereo), but when only one button is engaged, that signal is fed "center mono" to the headphones.

33. MONITOR level control
This control adjusts the sound level at the headphone jack and cue speaker.

34. PHONES jack
Plug a pair of 8 ohm or higher impedance stereo headphones into this 1/4" (6.3 mm) tip/ring/sleeve phone jack for monitoring the MTR-10 outputs.

35. LF COMP switches
The LF COMP (Low Frequency Compensation) switch on each AUDIO board is normally set to Off position. When low frequency boost or cut is desired, primarily to compensate for tapes which were made on other machines and which are deficient in bass response, turn On the LF COMP switches. This inserts a 6 dB/octave shelving equalizer with a knee at 100 Hz, and the maximum amount of boost or cut can be set by the LF COMP trimmer above the LF COMP switch.

36. MASTER BIAS switch
It is possible to preset the record bias levels for two different types of tape, which we designated as presets I and II. (Each preset actually consists of three presets, one per speed). The MASTER BIAS switch then selects the preset bias level for all audio channels at once. The "I" position is preset at the factory for Scotch #226 tape.

37. EQUALIZATION switch and
38. EQUALIZATION indicators
The equalization at 7.5 ips and 15 ips (and 3.75 ips on low speed versions) can be changed between NAB and IEC characteristics with the EQUALIZATION switch on the AUDIO CONTROL

circuit board. At 30 ips, the equalization is the AES curve. The selected EQ curve is displayed by the front panel EQUALIZATION indicators, as detailed below:

EQUALIZATION SWITCH POSITION	TAPE SPEED (Low Speed and Normal Versions)			
	3.75 ips (L)	7.5 ips (M) 7.5 ips (L)	15 ips (H) 15 ips (M)	30 ips (H)
NAB	NAB LED is On	NAB LED is On	NAB LED is On	Both LEDs are Off
IEC	IEC LED is On	IEC LED is On	IEC LED is On	Both LEDs are Off

39. REF FLUX switch, and
40. REF FLUX indicators

The REF (Reference) FLUX switch on the AUDIO CONTROL board sets the nominal 0 VU input and output level to correspond to one of three different tape flux levels: LOW (185 nWb/m), MID (250 nWb/m) or HIGH (320 nWb/m). A set of three front panel REF FLUX indicator LEDs display the setting selected by that switch.

41. CAPSTAN LOCK indicator

This bi-color LED indicates whether or not the capstan motor is rotating in phase-locked synchronization with the reference frequency. The LED normally should be green, indicating proper sync lock-up; a red color indicates the capstan is not locked in sync.

42. TEST switch and,
43. CPU condition (RUN) indicator

Pressing in the recessed TEST switch places the transport CPU in a special test mode which is used to set the reel motor torque. The RUN indicator above the switch is a bi-color LED; it is green for normal operation and red when the MTR-10 is switched to test mode. If the LED should turn red during normal operation, the CPU or related circuitry is probably malfunctioning.

44. TRANSPORT CONTROL circuit board (board A)

45. MASTER CPU circuit board (board B)

46. REEL CONTROL circuit board (board C)

47. CAPSTAN CONTROL circuit board (board D)

48. AUDIO CONTROL circuit board (board E)

49. AUDIO circuit board (labeled for channels 1 & 2 or 1 through 4)

3.3 FUNCTIONAL CHECKOUT

3.3.1 REEL INSTALLATION

The MTR-10's reel turntables accommodate small (7") or large (10-1/2") reels. (The MTR-12 accommodates reels up to 12".) The reel hold downs also serve as adaptors for the large reels to fit on the small diameter center spindles. The outer portion of the hold downs is split into lower and upper sections, and there are three extended flanges on these sections which engage the slots on larger diameter hubs. (Refer to figure 3-3 A-F, on next page.)

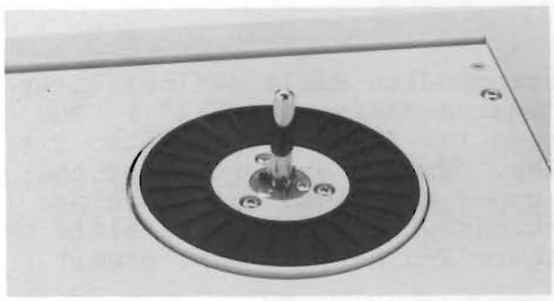
A. To install a small reel, slide the reel over the spindle (figure 3-3A). Loosen the gray reel hold down by graping its outer rim and unscrewing the smaller diameter inside knurled knob a few turns (CCW). Then slide the hold down over the spindle to hold the reel in place. Finally, tighten the hold down by grasping the outer rim and turning the center section clockwise until it stops (figure 3-3B). An optional quick-release hold down is available for smaller reels (figure 3-3C).

B. To install a large reel (10-1/2" or 12"), first install the gray reel hold down on the small center spindle, making sure it seats over the 3 alignment flanges at the base of the spindle (figure 3-3D). It may be necessary to first loosen the hold down by grasping its outer rim and unscrewing the smaller diameter inside knurled knob a few turns (CCW). Then tighten the hold down when it is seated on the spindle. Make sure the extended flanges on the upper portion of the hold down line up with the extended flanges on the lower portion (figure 3-3E); if not, lift up on the upper portion, then rotate it 30° in either direction and allow it to snap into place. The reel may now be placed on the turntable, the upper portion of the hold down lifted, then turned 30° and allowed to snap down and hold the reel in place (figure 3-3F). Gray reel hold-down are available in two types, one for 1/4" reels & the other for 1/2" reels. The hold-down for 1/4" reels and 1/2" reels cannot be interchanged.

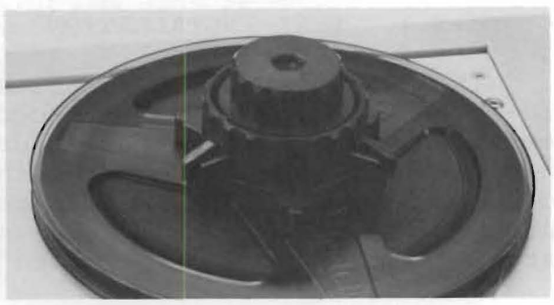
DO NOT YET THREAD THE TAPE.

CAUTION

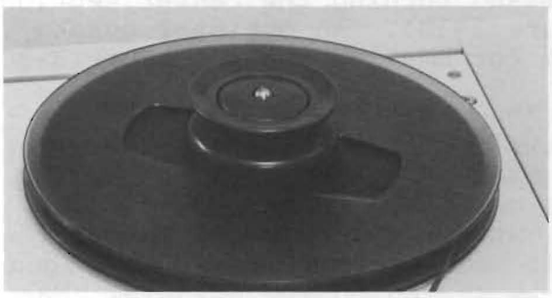
If, during the following procedures, there are any unusual sounds, mechanical malfunctions, strange odors, or anything that seems to be abnormal, immediately shut off the POWER switch, unplug the AC cord, and inspect the machine to determine the cause. If in doubt as to the cause or severity of a problem after consulting the appropriate section of this manual, contact Otari or the nearest Otari representative. DIN Adaptors are prepared for the MTR-10 and MTR-12 series. Please purchase a DIN adaptor assembly for use with a DIN pancake reel. Refer to Section 11 (page 11-4) for parts number.



A) Install the 7" reel over the turntable spindle.

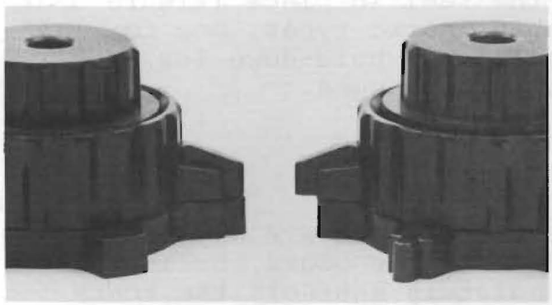


B) Slide hold down over the 7" reel and twist center clockwise to tighten.

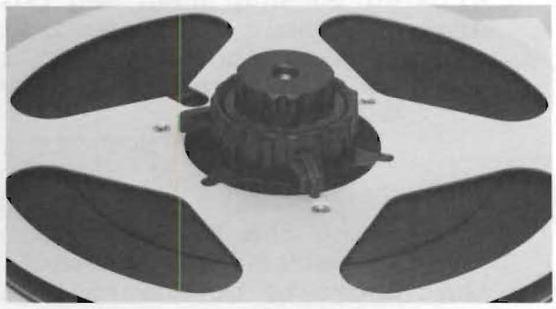


C) Optional quick-release hold-down for small reels.

D) Slide the hold down all the way down on the spindle and twist center CW to tighten prior to mounting a 10-1/2" reel.



E) Make sure the tabs on the upper and lower halves of the hold down are aligned. prior to mounting large reel.



F) Lift upper half of hold down, rotate it 60°, and release to lock the reel.

FIGURE 3-3. REEL CLAMP INSTALLATION FOR SMALL AND LARGE REELS

3.3.2 CHECKING TENSION COMPENSATION FOR TAPE WIDTH

There are a pair of DIP switches on the REEL CONTROL board (C) that set the reel tension to be appropriate for 1/4" wide or 1/2" wide tape. Prior to initial operation, remove the REEL CONTROL board, locate dual switch SW1 at location L-4 on the board, and check switch sliders #1 and #2; both should be Off for 1/4" tape, and both should be On for 1/2" tape.

3.3.3 POWERING UP

Before turning power On for the first time, set the transport's SPEED MODE switch to FIX position. Also, on the audio/monitor control panel, set both record mode switches to SAFE position, disengage all SRL buttons, turn the INPUT and OUTPUT level controls down (CCW), turn down the MONITOR LEVEL control, and set the TEST OSC switch to LINE.

Locate the POWER switch on the front panel at the lower right hand corner of the machine, and turn it On (press upper half of rocker switch). Observe carefully to ensure the following conditions are present:

A. The top 7 of 8 pilot lights (Light Emitting Diodes) above the switch should turn On, indicating the different secondary voltages from the power supply are present.

B. A few seconds after POWER is turned ON, the READY light immediately above the switch should turn On, indicating the audio circuits are unmuted (after any turn-on transients have been blocked). At this same instant, the LEDs above the output selector switches (corresponding to the selected status of INPUT, SEL-REP, or REPRO) should turn On.

CAUTION: Do not proceed if any section of the power supply is not operating, as the MTR-10 could be seriously damaged.

C. With no tape threaded, the RUN LED on the MASTER CPU board (board B) should be green, and the CAPSTAN LOCK LED on the CAPSTAN CONTROL board (board D) should be red.

D. The meter lamps should be On.

E. The lamps in the illuminated transport switch buttons should glow dimly (it may be difficult to see the glow of the blue STOP button if you are in a brightly lit room).

F. The Tape Time Counter to the left of the head assembly should indicate "0.00.00" in large red numerals.

G. The SPEED DISPLAY indicates the speed set.

H. The capstan motor should be Off (capstan not turning).

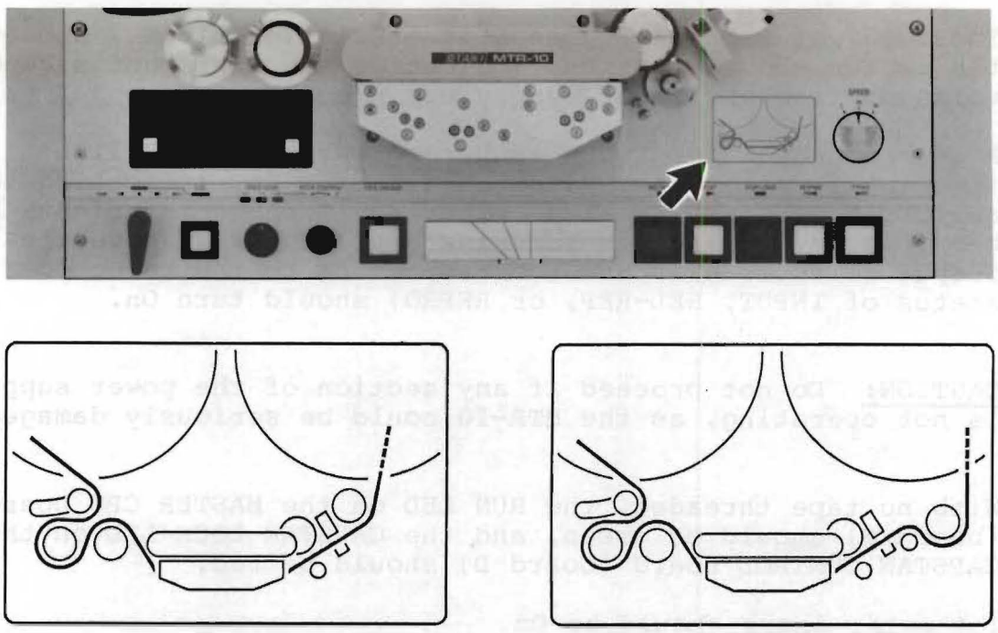
I. The reels should be stationary.

3.3.4 LOADING TAPE ON THE TRANSPORT

Thread tape exactly as shown in figure 3-4. Before threading, it is a good idea to pull enough tape from the supply reel to reach past the heads and wind around the takeup reel for at least two full turns. Do not fold the end of the tape, as the bump thus created will interfere with smooth packing of the tape on the reel.

NOTE: During these initial checkout procedures, you should use a "test" reel of tape rather than a virgin reel, master program, or alignment tape since it will be subject to erasure.

A. Take up all slack in the taking up slack in the tape so the safety switch is retracted. The STOP/LOAD button lamp will start to blink bright-then-dim.



MTR-10 MTR-12

FIGURE 3-4. TAPE THREADING DIAGRAM

B. Press the STOP/LOAD button. This releases the mechanical brakes on the reel motors and permits tape to be more easily spooled by hand. At the same time, the pinch roller should

move part way in toward the capstan shaft. At the same time, tape may run toward the reel which has a smaller diameter pack of tape (the takeup reel) for a second or two. This is normal while the CPU is measuring the tape diameter. However, if the diameter of tape wound on both reels is similar, the reels may remain stationary.

C. If the tape did not move in step B, there is no problem. Just press the PLAY, F.FWD or REWIND button to run tape a foot or two, and then press STOP/LOAD. The STOP/LOAD lamp will remain on brightly now, indicating tape pack diameters have been measured and the system is correctly tensionned.

NOTE: Neither steps B nor C above are required. If one were to press PLAY or place the machine in record mode immediately after threading tape, it would take a second or two for the unit to sense the tape pack diameters and automatically adjust tension. Pressing STOP/LOAD (to release the brakes) and then hand-turning the reels a few turns accomplishes the same thing. Steps B and C merely assure that correct tension will already be established in the event immediate and critical recording or reference playback is required upon threading tape.

3.3.5 THE TAPE SPEED AND RECORD/PLAY EQUALIZATION SELECTORS

(Remember, the SPEED MODE knob on the left of the transport should be in FIX position.) Changing the tape speed affects the standard record/play equalization characteristic. This procedure verifies the proper interaction. We recommend operating the SPEED switch only when the tape is stopped.

A. Press the SPEED DISPLAY button [18] so the digital display turns on and shows the selected tape speed. Verify the LED adjacent to the "ips" nomenclature is ON; if the "%" LED is On, press the "ips/%" button [19] so that speed in inches per second will be shown on the display. Note that the display does not indicate stop (no speed) or fast winding speed, but rather the speed that will be achieved in Record or Play mode.

B. Set the SPEED switch on the right side of the head assembly to "H" position for "high" speed.

Both green NAB and IEC EQUALIZATION lights on the audio control/monitor panel should be Off, indicating AES equalization is being provided. (Both EQ LEDs are Off only on standard speed machines; for low speed machines, IEC or NAB EQ LED is On.) Also, the Speed Display [17] should indicated 30.00 ips (or 15.00 ips on low speed models).

C. Set the SPEED switch to "M" position. The IEC or NAB EQUALIZATION light should now turn ON, depending on the setting of

the EQUALIZATION slide switch on the AUDIO CONTROL board (board E). Notice the capstan shaft slow down, and the Speed Display change to 15.00 ips (07.50 ips on low speed models).

D. Move the SPEED switch to "L" position; the same EQUALIZATION light should remain On. Again, notice the capstan shaft slow down. The Speed Display should indicate 07.50 ips (03.75 ips on low speed models).

E. Slide the EQUALIZATION switch on the AUDIO CONTROL board to the other position (e.g., IEC if in NAB position, or vice-versa), and make sure the corresponding light on the audio control/monitor panel is illuminated.

3.3.6 NORMAL PLAY MODE

Press the PLAY (>) button [7]; it should now be brightly illuminated, and tape should wind smoothly onto the takeup reel at the selected SPEED [3].

NOTE: This verifies that the transport functions in Play mode (though actual running speed has not been verified yet). We have intentionally skipped checkout of the RECORD button [8] for now.

3.3.7 REVERSE PLAY MODE

Simultaneously press down the PLAY (>) [7] and REWIND (<<) [5] buttons. Both buttons should be brightly illuminated, and tape should wind onto the supply reel at approximately the selected SPEED ("H", "M", "L").

3.3.8 FAST WINDING MODES

A. Press the F.FWD (>>) button [4]. The F.FWD button should be brightly illuminated, and tape should wind forward rapidly onto the takeup reel. Notice that the pinch roller moves farther away from the capstan. After a minute, press STOP, and notice that the pinch roller moves closer to the capstan after tape motion ceases.

B. Press the REWIND (<<) button [5]. The REWIND button should be brightly illuminated, the pinch roller should move out, and tape should wind rapidly onto the supply reel.

C. The transport can be switched between Play, Rewind, and Fast Forward modes without using the STOP/LOAD button [6].

D. While in Rewind mode, allow the tape to spill off the takeup reel. The supply reel should stop after several turns, and

all tape motion buttons should return to dim illumination.

E. Rethread the tape, and take up the slack to engage the end-of-tape safety sensor switch.

3.3.9 SPOOLING MODE

A. Simultaneously press the F.FWD button [4] and the EDIT/UNLOAD button [9]. Both buttons should be brightly illuminated, and tape should wind smoothly onto the takeup reel at about 120 ips (about half normal fast forward speed).

B. Simultaneously press the REWIND button [5] and the EDIT/UNLOAD button [9]. Both buttons should be brightly illuminated, and tape should wind onto the supply reel at about 120 ips.

C. Press the STOP/LOAD button.

3.3.10 SHUTTLE CUE MODE

A. Press the CUE button [12], which should then be brightly illuminated. After a second, you may notice the swing arm near the supply reel move outward and then return toward the center of the transport, indicating the servo system is checking the tape tension.

B. Push the Cue lever [13] to the right; the farther to the right the lever is moved, the faster tape should wind onto the takeup reel.

C. Push the Cue lever [13] to the left; the farther to the left the lever is moved, the faster tape should wind onto the supply reel.

D. Center the Cue lever (the position to which it should return when you let go of it) to stop tape motion. To exit Cue mode, press any of these buttons: STOP/LOAD, PLAY (>), FAST FORWARD (>>) or REWIND (<<).

3.3.11 FAST CUE MODE

CAUTION

For this procedure, be sure the monitor amplifier volume is down. If there is any program recorded on the tape, a high pitched squeal will occur that might otherwise damage your loudspeakers (even though the MTR-10 audio output is automatically attenuated approximately 6 to 10 dB).

This mode permits auditioning of the tape during Fast Forward or Rewind modes by retracting the tape lifters. Press FAST FORWARD, and then, while tape is moving, press the CUE button [12]. The

tape lifters should be retracted for as long as you hold down the CUE button. Note that the CUE button does not become brightly illuminated in this case. (Also, note that the unit does not enter spooling mode, as it would if both the CUE and FAST FORWARD buttons were pressed simultaneously.)

3.3.12 EDIT/UNLOAD

This mode shuts off the reel servos and defeats the End of tape (safety) switch so the reels can be turned by hand, or a "dump edit" can be made. The Edit/Unload mode can be entered from Stop/Load, Play, and unloaded (no tape) mode.

A. With the transport in Stop mode, attempt to turn the supply or takeup reel; you will notice that tape automatically winds off the other reel to maintain constant tension.

B. Press EDIT/UNLOAD [9]. The button will begin to flash, and you should be able to manually wind tape off either reel without having the other reel automatically take up the slack.

C. Manually take up any slack in the tape, and BE READY TO PRESS STOP/LOAD [6]. With the unit still in Edit/Unload mode, press the PLAY button [7]. Notice that the EDIT/UNLOAD and PLAY buttons are BOTH brightly illuminated, and tape is pulled past the heads at the selected SPEED and is spilled off the machine since the takeup reel remains stationary.

D. Press STOP/LOAD to prevent excess tape spillage and exit the Edit/Unload mode. Then manually wind the tape back onto the reels to take up all slack.

E. Press the PLAY button [7]. While the tape is moving, press the EDIT/UNLOAD button. The PLAY and the EDIT/UNLOAD buttons will both be brightly illuminated, the takeup reel will stop rotating and tape will be spilled off the machine.

F. Press STOP/LOAD to prevent excess tape spillage and exit the Edit/Unload mode. Then manually wind the tape back onto the reels to take up all slack.

3.3.13 SPEED MODE SELECTION

The SPEED MODE switch [10] provides a choice of three references for tape speed control. The functional checks thus far have been done in FIX mode, which fixes the capstan speed, by reference to an internal crystal oscillator, at either 7.5 ips (19 cm/s), 15 ips (38 cm/s) or 30 ips (76 cm/s), depending upon the position of the TAPE SPEED switch [3] (or half these speeds for the low speed model).

A. In VARI mode, the capstan speed can be varied over a range of about ±20%, or almost four musical steps, as set by the

adjacent PITCH CONTROL [11]. The amount of speed variation is indicated on the digital Tape Speed readout (provided it is turned on -- if not, press the SPEED DISPLAY button [18]). The play/record speed will be shown if the LED next to the "ips" label on the right is illuminated. The percentage of the selected speed will be displayed if the LED next to the "%" label is illuminated. Press the "ips/%" button [19] to change the Speed Display.

B. Turn the PITCH CONTROL [11] to change the tape speed. Note this is a 5-turn potentiometer.

C. EXT mode permits the capstan speed to be varied by reference to an external reference oscillator (e.g., in a synchronizer) or an external voltage source, potentiometer (e.g., in the Auto Locator).

NOTE: If EXT mode is selected and no suitable external reference oscillator is driving the PARALLEL I/O connector (or a variable resistor is not connected to the proper pins of the AUTO LOCATOR connector), the MTR-10 will automatically operate as though FIX mode had been selected, even though the amber EXT indicator LED will be illuminated.

3.3.14 SEARCH TO ZERO

A. Press the RESET button [15] at the right side of the Tape Time Display, which will set the display to 0 hours, 00 minutes, 00 seconds (0.00.00).

B. Press the F.FWD button and wind tape ahead about 3 minutes on the display (this should take only about 15 seconds in real time).

C. While tape is winding (or after first pressing STOP/LOAD), press the SEARCH ZERO button [16] on the left side of the Tape Time display.

D. The REWIND button [5] will become brightly illuminated, and tape will begin rapidly winding toward 0.00.00. As the time displayed is about 0.01.00, the pinch roller will move to the mid position (closer to the capstan), and the REWIND and F.FWD button will alternately toggle to brighter illumination as the tape slows down.

E. The tape will park at a display of -0.00.00, and the STOP/LOAD button will be brightly illuminated. (Had tape been initially rewound to a negative tape time, SEARCH ZERO would have caused the tape to wind forward and stop at positive 0.00.00 on the display.)

3.4 REMOTE CONTROL BOX (REMOTE BOX) FUNCTIONAL CHECKOUT

The basic Model CB-102, or the more sophisticated Model CB-111 both have buttons that perform the same functions as their counterparts on the MTR-10. Simply perform the corresponding procedures from the previous sub-sections of this manual to verify proper Remote Box operation. The function buttons on the MTR-10 should be illuminated to correspond to the functions selected with the remote box.

3.5 THE AUTO LOCATOR

Operation of the CB-109 is covered in Section 7 of this manual. No special functional checkout is required, although buttons for basic transport functions should operate just as their counterparts on the MTR-10, with two exceptions: (1) Resetting Tape Time to 0.00.00 on the Auto Locator does not zero the MTR-10 display, and vice-versa, and (2) pressing the Auto Locator CUE button will retract the tape lifters during fast winding, but will not permit the unit to be placed in Cue/Edit mode or in forward or reverse spooling mode.

3.6 AUDIO/MONITOR CONTROL FUNCTION (INCLUDING RECORD) CHECKOUT

NOTE: The numbers in square brackets [ ] refer to the features identified in figures 3-1 and 3-2.

3.6.1 RECORD MODE

A. Set one of the two record mode switches [28] to READY mode. The red LED above the switch should begin blinking On and Off, and the red RECORD button [8] should flash bright and dim.

B. Press the PLAY button [7], tape will begin to wind past the heads onto the takeup reel. Press the RECORD button [8]. It should now remain brightly illuminated, and the blinking READY/SAFE LED [29] also should remain On steadily, indicating the track is recording. The READY/SAFE LED on any other channel that is not recording will now be blinking to indicate the track is record ready.

C. Move the record mode switch on the remaining channel(s) to READY position, and notice the red LED(s) above the switch(es) remains on steadily to indicate the track(s) is recording.

D. To exit Record mode on a single track, move its record mode switch to SAFE position. The READY/SAFE LED above it should again blink On and Off.

E. To exit Record mode on all tracks, and keep tape playing, press the PLAY button [7]. The RECORD button [8] will now flash bright and dim, the PLAY button will remain bright, and the READY/SAFE LEDs [29] will again begin blinking.

F. To exit Record mode and stop tape, press STOP/LOAD [6].

3.6.2 INDIVIDUAL CHANNEL OUTPUT SELECTION (AUDIO MONITOR)

NOTE: There is a functional interaction of the record mode switches [28] and the output selector switches [26], as will be explained. The source of the output signal, and the LED indicators [27] also change, in some cases when the machine is switched between Play and Record modes.

Two (or four) lever type 3-position output selector switches [26] independently determine the signal source which drives each of the MTR-10's channel output amplifiers, VU meters and output jacks unless the channel is in the Record mode. A column of 3 LEDs above each switch [27] indicates the selected source, which may be the INPUT, SEL-REP (playback from the record head), or REPRO (playback from the reproduction head). Move each of these switches, and observe the LEDs above them to verify proper operation, as described below.

NOTE: Initially place all channels' record mode switches [28] in READY mode (LEDs flashing), and press the STOP/LOAD button [6]. Turn the TEST OSCillator switch [30] to 1 kHz sine wave position to obtain an input reference signal for all channels.

To prepare to audibly monitor the results of these procedures, engage the INPUT SRL and OUTPUT SRL buttons [23] to set the input and output at standard reference levels. Also, turn down your sound system monitor speakers to a safe (reduced) level, or plug a set of headphones into the PHONES jack [35] and set the MONITOR LEVEL control [33] at about 12:00 position, or engage the cue speaker switches [34] and set the MONITOR LEVEL control [33] at about 12:00 position.

A. INPUT mode.

With the channel's output monitor selector switch [26] set to INPUT position (lever up), the output should be monitoring the input signal, not the signal on tape, whether the machine is in Stop, Play or Record mode. Since the built-in test oscillator is the input source, you should hear a 1 kHz tone. The channel's amber LED [27, top row] should be illuminated.

B. SEL-REP mode.

1. Press the STOP/LOAD button [6], and set the channel's monitor selector switch [26] to the SEL-REP position (switch centered). The channel's output should no longer be monitoring the input signal (tone stops), and the green LED [27, middle row] should be illuminated. If there is any program recorded on the tape, you should hear it.

2. Press the PLAY button [7]. The channel's output status should not change, nor should the monitor LEDs [27].

3. Press the RECORD button [8], which should place the machine in Record mode, causing the RECORD and PLAY button lights to remain bright, and the READY/SAFE LEDs [29] to stay On. The channel's output signal should now automatically switch so it is derived from the input signal, in this case the 1 kHz tone, and the amber LED [27, top row] should be illuminated.

4. Move the channel's record mode switch [28] down to SAFE position, causing that channel to drop out of Record mode, as indicated by the blinking red LED [29]. Observe that the channel output signal is again switched so it comes from the record head and sync amp, as indicated by the green SEL-REP LED [27] and the loss of the input tone.

C. REPRO (PLAY) mode.

1. With the channel still in Safe mode, press the STOP/LOAD button [6], and set the channel output selector switch [26] to REPRO position (switch down). The channel's output signal should now be playback derived from the reproduce head and the repro electronics. The corresponding orange LED [27, bottom row] should be illuminated.

2. Move the record mode switches [28] up to READY position; notice the output signal source is unaffected.

3. Press the PLAY button [7]. The channel's output should still be derived from the reproduce electronics, as indicated by the bottom row orange LED (and the lack of a 1 kHz tone provided the tape is blank).

4. Press the RECORD button [8], placing the machine in Record mode. There should be no change in the channel's output status; i.e., it should still be derived from the reproduce electronics. However, you should begin hearing the 1 kHz test tone after a moment, since the tone is being recorded, and you will hear the playback of that tone from tape.

5. Press the STOP/LOAD button [6]. The channel's output status does not change, but the tone will cease since no tape is moving past the REPRO head. To demonstrate this to yourself, manually wind the tape backwards a foot or so while listening to the output tone.

3.7 INPUT AND OUTPUT LEVEL CONTROLS

Set the output selector switches [26] to INPUT position, and, with the TEST OSCillator [30] still set to 1 kHz sine wave tone, observe the VU meters [24].

A. With the SRL buttons [23] adjacent to the INPUT level controls [21] press in, the amber LEDs above those controls should be illuminated, and the VU meters should indicate 0 VU (or close to that value if the system is not quite calibrated). Adjust the INPUT level controls (knobs with orange dot in the center) and notice they have no effect.

B. Disengage the INPUT SRL buttons. The amber LEDs should turn Off, and the level on the VU meters (and at the cue speaker, HEADPHONE jack and LINE OUT XLRs) is now adjustable by means of the INPUT level controls.

C. Set the output selector switches [26] to REPRO position, the record mode switches [28] to READY position, and press the PLAY and RECORD buttons to place the transport in Record mode. Since the 1 kHz test signal is now being recorded and played back, both the INPUT and OUTPUT level controls (or SRL buttons) affect VU meters, monitor speaker, and LINE OUTPUT levels.

Try engaging and releasing the OUTPUT SRL buttons [23] while adjusting the OUTPUT level controls [22] (knobs with blue dot in center), and again observe the VU meters and output levels. Then, with OUTPUT SRL engaged, operate the INPUT SRL and LEVEL controls. All should affect the level.

4

SECTION 4

AUDIO ALIGNMENT

4.1 GENERAL DESCRIPTION

The record and reproduce audio signals for each track are processed on an individual plug-in AUDIO circuit board (numbered 1 & 2 on 2-track models, or 1-4 on 4-track models). Each of these boards has front-panel adjustments for gain, equalization, phase compensation, standard reference level (corresponding to the SRL button on the control panel), sensitivity, and channel bias. (Refer to figure 4-1.)

Additionally, there is one AUDIO CONTROL circuit board (labeled "E") whose various front panel controls and switches affect all the AUDIO circuit boards (1 & 2 or 1-4). (Refer to figure 4-1.) This board has trimmers to adjust the zero level of the built-in test oscillator at 100 Hz, 1 kHz and 10 kHz. There is a switch to preset the standard input/output levels for low (185 nWb/m), mid (250 nWb/m) or high (320 nWb/m IEC) reference flux level on tape, and this switch's setting is also indicated on the front panel REF FLUX display. Another switch sets the record/play equalization when the transport is operating at low speed (7-1/2 ips = 19 cm/s) or medium speed (15 ips = 38 cm/s) to either IEC or NAB characteristics (switch affects all three speeds on the low speed MTR-10); this switch's setting is also indicated on the front panel EQUALIZATION display. When the transport is operating at high speed (30 ips = 76 cm/s), the equalization is automatically switched to the AES characteristic, and both front panel EQUALIZATION display lights are Off.

> NOTE: IEC is an abbreviation for International Electrotechnical Commission. NAB is an abbreviation for National Association of Broadcasters (USA). AES is an abbreviation for Audio Engineering Society. The equalization characteristics selected for the MTR-10 conform to standards promulgated by these organizations.

The AUDIO CONTROL board has a feature that is invaluable for fast setups, especially when switching record/repro speeds or changing tape formulations: MASTER BIAS pots for high (H), mid (M) and low (L) record speeds. Once the individual AUDIO board bias controls have been balanced so that track-to-track bias levels are consistent, the AUDIO CONTROL MASTER BIAS trimmers allow single-point adjustment of the bias level for all two or four tracks. When speed is changed, the bias automatically switches to whatever level is set with these MASTER BIAS trimmers. For even greater convenience, two sets of MASTER BIAS trimmers are provided, labeled I and II, with a slide switch to select the "active" bank of trimmers. This allows two different bias levels to be preset for each of the three operating speeds, making it possible to instantly switch between two tape formulations without extensive realignment.

This section of the manual describes how to completely align the audio circuitry for optimum record/play performance. Section 4.2 covers demagnetizing, and 4.3 covers cleaning, two procedures which should precede actual alignment. Section 4.4 covers initial audio card calibration; this procedure has been performed at OTARI prior to shipment of your MTR-10, and is provided here primarily for verification or in the event a part or a circuit board is replaced. NORMAL DAY-TO-DAY ALIGNMENT DOES NOT REQUIRE THE PROCEDURES IN SECTION 4.3, AND BEGINS WITH SECTION 4.5.

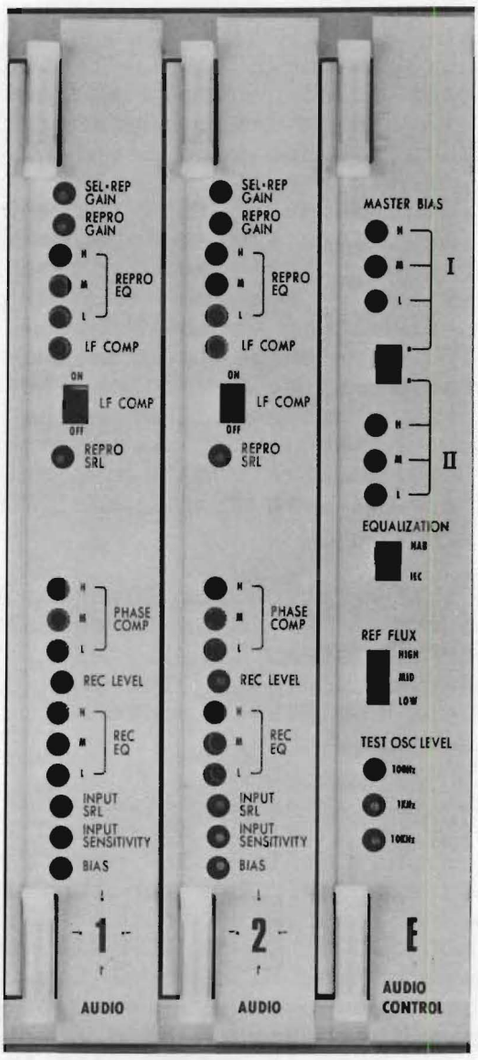


FIGURE 4-1. FRONT PANEL CONTROLS ON THE AUDIO AND AUDIO CONTROL CIRCUIT BOARDS

1. To align the MTR-10, you will need the following items:

   A. A suitable test tape, preferably one which runs at the speed for which the alignment is to be optimized. We recommend the following tapes, manufactured by MRL (Magnetic Reference Laboratory) as being suitable:

      For 30 ips (76 cm/s): MRL Cat. No. 21L221 (250 nWb/m²)

      For 15 ips (38 cm/s): MRL Cat. No. 21J205 (250 nWb/m²)

      For 7.5 ips (19 cm/s): MRL Cat. No. 21T104 (200 nWb/m²)

   B. Two AC high impedance voltmeters, such as the Hewlett-Packard (H-P) Model 400 or equivalent.

   C. A dual trace oscilloscope.

   D. A test oscillator capable of generating the following frequencies: 125 Hz, 700 Hz or 1 kHz, 10 kHz and 15 kHz at +4 dBm or whatever standard 0 VU operating level you have chosen for your sound system. The oscillator also should be capable of delivering +15 dBm to the MTR-10.

   E. An extender board for the MTR-10 circuit cards (available from Otari).

   F. A reel of recording tape of the type you intend to use for the session (i.e., Scotch 226 or equivalent).

   G. A non-metallic alignment screwdriver whose blade is small enough to be inserted in the multi-turn trimmer potentiometers on the AUDIO and AUDIO CONTROL boards.

   H. A non-metallic allen key (2.5 mm) for adjusting the bias transformer slugs.

   I. A head demagnetizer (degausser).

   J. Pure isopropyl alcohol or Otari Head Cleaner, and cotton swabs for head cleaning.

      CAUTION: DO NOT USE RUBBING ALCOHOL, as this can leave water and oil residues, and DO NOT USE OTHER SOLVENTS, as they may de-laminate the heads.

2. When you are performing these procedures for the first several times, proceed slowly and carefully. Soon you will be fully familiar with them, but initially it is truly "better safe than sorry," as the saying goes.

4.2 DEMAGNETIZING THE HEADS AND TAPE GUIDANCE PATH

Demagnetizing (sometimes called degaussing, although that term more often refers to bulk tape erasure) is a necessary procedure, and should be performed prior to every alignment and recording session. It should always be done with extreme care.

DEMAGNETIZING CAUTION: To avoid damage to the MTR-10, always make sure the POWER switch is off before proceeding. Also, remove all recording tape, especially alignment tapes, from the vicinity of the MTR-10. The AC field created by the demagnetizer is extremely powerful and could seriously damage electronics if they are powered up.

DEMAGNETIZING CAUTION: Never turn on or turn off the power to the demagnetizer unless it is at least 3 feet (1 meter) away from the MTR-10. This would create an especially strong moving magnetic field which could possibly place a permanent magnetic charge on parts of the tape machine. The demagnetizer would not be powerful enough to remove such charges under normal operating conditions, and the parts might therefore have to be discarded. USE ONLY A PROFESSIONAL DEMAGNETIZER OF HIGH FLUX DENSITY; INEXPENSIVE "HI-FI" TYPE DEMAGNETIZERS CAN LEAVE RESIDUAL FIELDS THAT WILL CAUSE MORE HARM THAN BENEFIT.

1. Turn OFF the MTR-10 POWER switch.

2. With the demagnetizer at least 3 feet (1 meter) away from the MTR-10, plug the demagnetizer into the power mains and turn it on.

3. Slowly move the demagnetizer toward the supply swing arm roller (on the left side of the transport) until the tip is about 1/8 inch away (3 mm).

4. Slowly move the demagnetizer tip up and down along the roller so that the entire roller surface is directly exposed to the demagnetizing field. DO NOT TOUCH ANY MTR-10 PARTS with the demagnetizer.

5. Slowly move the demagnetizer at least 3 feet (1 meter) away from the MTR-10.

6. Working from left to right, repeat steps 3, 4, and 5 for each additional metallic part in the tape path (left to right):

   A. Guide rollers
   B. Two fixed tape guides
   C. Tape lifter (left)
   D. Erase head
   E. Record head
   F. Tape lifter (right)
   G. Reproduce head
   H. Fixed tape guide
   I. Capstan
   J. Tape shutoff sensor
   K. Guide roller

7. When all the above parts have been demagnetized, draw the demagnetizer at least 3 feet (1 meter) away, turn it OFF and/or unplug it.

4.3 CLEANING THE TAPE PATH

It is important to regularly clean the route along which the tape travels. Oxide and dirt will shed from tape and accumulate on these parts, causing a build-up that can create slippage, degrade frequency response, and accelerate tape wear.

CAUTION: Never use any metallic item or abrasive to clean the heads or other tape guidance parts. Never use spirits, lacquer thinner, acetone, or other solvents on the tape heads. Rubbing alcohol should be avoided since it contains oil that will leave a residue.

1. Moisten a cotton swab with pure isopropyl alcohol, and wipe the entire surface of the supply swing arm roller. Allow the roller to dry by evaporation.

2. Moisten additional swabs, and clean the following parts (from left to right):

A. Guide rollers
B. Tachometer roller
C. Two fixed tape guides
D. Tape lifter (left)
E. Erase head
F. Record head
G. Tape lifter (right)
H. Reproduce head
I. Fixed tape guide
J. Capstan & pinch roller
K. Tape shutoff sensor
L. Guide roller

CAUTION: DO NOT USE ALCOHOL-MOISTENED SWABS TO CLEAN THE TACHOMETER OR CAPSTAN PINCH ROLLERS. In order to avoid fibers and dust particles embedding themselves in the surface of these rollers, a lint-free cloth should be moistened with alcohol and used to gently wipe the rollers.

This should be done before a hard glaze appears on the rollers.

NOTE: Additional maintenance information is in Section 10.

4.4 AUDIO CIRCUIT BOARD PRELIMINARY ALIGNMENT (OCCASIONAL)

As explained in Section 4.1, this procedure is not part of the normal alignment process. It should be performed whenever any repair or replacement is made to the audio board, or whenever the heads are changed. It is a good idea, however, to perform this procedure occasionally merely to verify proper level calibration.

The following steps 5 through 19 should be done for each of the AUDIO boards (1 and 2 on 2-track machines, or 1 through 4 on 4-track machines).

1. The MTR-10 POWER switch should be Off.

2. Grasp the innermost ends of the extractor tabs at the top and bottom of AUDIO board, and pull to remove the board from its card frame. Holding the extender board so its test points are on the right side, firmly push it into the vacant card frame slot. Then plug the AUDIO board into the female connector on the extender board.

3. Turn On the MTR-10 POWER switch.

4. Set the AUDIO CONTROL board (board E) REF FLUX switch (SW1) to HIGH position.

5. Turn Off the LF COMP switch (SW1) on the AUDIO board.

   NOTE: The reference levels used in these procedures may differ in your application or country. (e.g., +4, +6, +8 dBm.)

6. Connect an external audio oscillator to the LINE INPUT XLR connector of the track whose AUDIO board is being adjusted. Apply a 1 kHz (approx.) signal at -6 dBm (385 mV) to that input. (This is used to set the maximum gain 10 dBm greater than the 0 dB reference level.)

7. Connect a dB meter (or a sensitive rms voltmeter) to the same track's LINE OUTPUT XLR.

   NOTE: The controls and switches on steps 8 through 11 are located on the MTR-10's audio control panel.

8. Set the MTR-10's TEST OSC switch to LINE position.

9. Set the MTR-10's output selector switches (INPUT/SEL-REP/REPRO) to INPUT position.

10. Make sure the SRL button corresponding to the track's INPUT level control is disengaged (button out).

11. Turn the INPUT level to maximum (fully clockwise).

12. On the AUDIO board, adjust the INPUT SENSITIVITY trimmer (VR-11) to obtain a "0" level indication on the track's VU meter (the meter on the MTR-10's audio control panel).

13. Press in the track's INPUT SRL button.

14. Adjust the external oscillator for a +4 dBm (1.23 V) output level. This is used for a "0" reference adjustment.

15. Adjust the INPUT SRL trimmer (VR-12) on the front of the corresponding AUDIO board for an MTR-10 VU meter reading of 0 VU.

16. With the AUDIO board still extended from step 2, and an external meter still connected to the track's LINE OUTPUT XLR, adjust VR-8 (near the upper edge of the AUDIO board) for +4 dBm output.

IMPORTANT NOTE REGARDING LEVEL MEASUREMENTS

The MTR-10 has an active balanced output configuration with cross-coupled feedback. When level is measured across pin 2 and ground or pin 3 and ground, the readings will be 6 dB lower than in balanced mode. If one side of the line is grounded when measuring "unbalanced" across pin 2 or pin 3 to ground, the level remains the same as in balanced mode.

17. To check the headphone level: with no load and the MONITOR LEVEL pot at maximum (fully clockwise), the output level should be about +19.5 dBm (7.25 V rms) at 0 VU reference. This is not a critical level.

18. It is recommended that the PEAK indicator LED in the MTR-10 VU meter be set to just turn On at +15 dBm, although other levels may be used. To accomplish this adjustment, increase the external oscillator level so that it delivers the 1 kHz signal at +15 dBm (or whatever peak level you desire) to the MTR-10 LINE INPUT connector. Then locate trimmer VR-9 in the middle of the AUDIO board, and adjust it so the track's PEAK LED just turns On.

19. Verify proper adjustment of VR-9 by reducing the output of the external oscillator about 0.5 dB; the PEAK LED should turn Off.

20. Set the MTR-10's built-in TEST OSCillator (front panel switch) to 1 kHz square wave.

21. Locate trimmer VR-10 at the lower edge of the AUDIO board, and adjust it so the track's VU meter indicates 0 VU. This aligns the built-in oscillator to the AUDIO board.

NOTE: Repeat the preceding steps, 5 through 21, for each of the two or four AUDIO boards. The following step, 22, calibrates the level of the built-in test oscillator.

22. Set the MTR-10's built-in TEST OSCillator to 1 kHz sine wave and adjust the 1 kHz trimmer (VR-2) on the front panel of the AUDIO CONTROL board (E) so the VU meters indicate 0 VU. Similarly, set the TEST OSCillator to 10 kHz sine wave and adjust the 10 kHz trimmer (VR-3). Set the TEST OSCillator to 100 Hz and adjust the 100 Hz trimmer (VR-1) for 0 VU. This completes the preliminary audio alignment procedure.

4.5 REPRO (AND SEL-REP) ALIGNMENT

This is the reproduce or "play" alignment most often done when setting up the MTR-10. Although Sel-Rep calibration involves the record head, it is also included here because the purpose is still playback. Repro head azimuth adjustments are included as part of this alignment because slight differences in azimuth between tapes made on different machines, or on the same machine at different times, can significantly impact the frequency/phase response. Record head azimuth alignment is also included for reasons stated in Section 4.6. Adjustment of the head wrap, height, and zenith are not normally part of this procedure.

1. With POWER On, thread a suitable calibrated, reproduce alignment tape on the transport (refer to the list in Section 4.1).

2. Set the REF FLUX switch on the AUDIO CONTROL board (E) to an appropriate setting for the alignment tape in use (see below).

RELATIVE LEVEL on tape	ACTUAL FLUX LEVEL (nanoWebers/meter)	REF FLUX SWITCH (Set on board E)
+3.8 dB	320	HIGH
+2.6 dB	250	MID
0 dB	185	LOW

3. If using the mid speed (15 ips = 38 cm/s) or low speed (7.5 ips = 19 cm/s) on standard machines (or any speed on low speed versions), set the EQUALIZATION switch (SW2) on the AUDIO CONTROL board (E) to the appropriate setting for the alignment tape in use (IEC or NAB). The MRL tapes we recommend are available for either NAB or IEC equalization. At high (30 ips = 76 cm/s) speed the EQ is automatically set to AES standard, and the EQ switch setting has no difference.

4. Connect the dual trace oscilloscope to the two "outer" tracks' LINE OUTPUTs (e.g., tracks 1 and 2 of a 2-track machine, or tracks 1 and 4 of a 4-track machine). Also, connect an AC Voltmeter to each of these tracks.

   NOTE: The controls and indicators cited in steps 5 and 6 are on the MTR-10 audio control panel.

5. Advance the alignment tape to the beginning of the 1 kHz calibration tone. (HINT: Zero the MTR-10 counter at this point; then, if more 1 kHz tone is needed, you can easily return to the beginning of that tone using the SEARCH ZERO button.)

   NOTE: In order to monitor the alignment tape, you may use either the cue speaker built into the MTR-10, or you may plug in a set of headphones. In either case, engage the track push-buttons (1 and 2 or 1 through 4) on the MTR-10 audio/monitor panel, and adjust the adjacent MONITOR LEVEL control as desired.

6. Set the MTR-10 output selector switches to REPRO position, make sure the OUTPUT SRL buttons are disengaged (buttons out), and make sure the LF COMP switches (SW1) on the AUDIO boards are turned Off.

7. Playing a 1 kHz tone at standard reference level, adjust the two "outer" tracks OUTPUT level controls so the VU meters indicate 0 VU.

8. Playing the 8 kHz calibration tone, and, using the allen hex wrench, gradually adjust the head azimuth for coincident sine waves (proper phase response) on the oscilloscope. Refer to figure 4-2 for the location of the repro head azimuth adjust screw.

   NOTE: Normally, correct head azimuth alignment is the result of left-to-right head tilt adjustment as depicted by a meter peak when the two outer tracks' outputs are summed. When the azimuth adjustment is performed viewing a dual trace oscilloscope, as described here, a more precise phase correlation between the tracks is obtained.

9. The previous step provided a coarse azimuth/phase adjustment. Now play a 16 kHz calibration tone, and again adjust the repro azimuth screw so the scope waveforms coincide. This is a more exacting adjustment.

10. Now, set the MTR-10 output selector switches to SEL-REP position, and repeat steps 7 and 8, but adjust the record head azimuth screw. (Refer to figure 4-2).

11. Return to the beginning of the 1 kHz calibration tone. With all SRL buttons disengaged, turn the OUTPUT level controls fully clockwise, and set all tracks' output selector switches to REPRO position.

    NOTE: The reference levels used in these procedures may differ in your application or country. (e.g., +4, +6, +8 dBm.)

12. Play the 1 kHz tone, and adjust the REPRO GAIN trimmer (VR1) on the front of each AUDIO board for +14 dBm output level

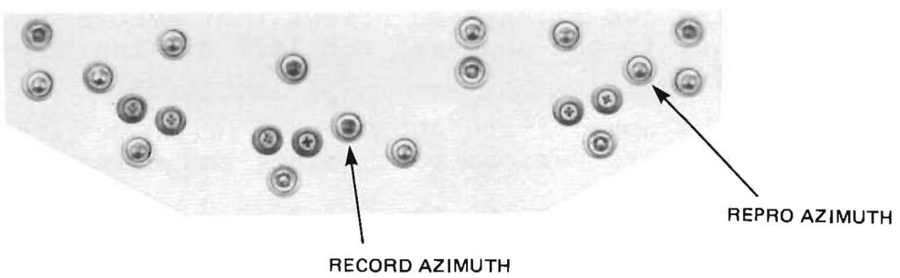


FIGURE 4-2. REPRO AND RECORD HEAD AZIMUTH ADJUSTMENT SCREWS.

(3.85 Volts). This output level is used for a maximum gain setting 10 dBm greater than 0 reference. (You will have to connect the external voltmeter(s) to each track to make these adjustments.)

13. Repeat step 12, but switch to Sel-Rep mode and use the SEL-REP GAIN trimmer (VR2) on each AUDIO board.

14. With the standard 1 kHz tone still playing, move the output selector switches to Repro mode, and engage all OUTPUT SRL buttons. Then adjust the REPRO SRL trimmer (VR7) on each AUDIO board to obtain a 0 VU reading on that track's VU meter.

15. Play the 10 kHz tone on the alignment tape, and adjust the appropriate REPRO EQ trimmer on each AUDIO board to also obtain a 0 VU indication on the corresponding VU meter. (At this time a 0 VU reading should correspond to an external meter reading of +4 dBm.) Note that there are three such trimmers, "H", "M", and "L" (VR3, VR4 and VR5), and you will have to adjust only the trimmer that corresponds to the speed of the particular alignment tape being played.

    Adjust REPRO EQ to meet the REPRO response specifications given on page 11-2 for the speed selected.

4.6 RECORD ALIGNMENT

Azimuth adjustment is not done as part of the record alignment procedure because the MTR-10's record phase compensation circuitry would make it difficult to establish proper azimuth as a function of record/play phase response, due to differences in BIAS and EQ adjustments for each formulation of tape. During the reproduce alignment procedure in Section 4.5, the Sel-Rep reproduction procedure allowed the record head azimuth to be adjusted to the alignment tape in exactly the same manner as the repro head; since both the record and repro heads were aligned to the same tape, they are aligned to each other.

4.6.1 BIAS ADJUSTMENT

The following procedure calibrates the erase and bias levels, as well as the record level and record EQ.

1. Remove the two allen-head screws that secure the head assembly rear cover to the chassis, and lift off the cover. (Refer to Figure 4-3.)

2. Extend the appropriate AUDIO board (with an extender board) to gain access to various test points and trimmers.

3. Thread a blank tape on the transport.

4. Connect both an oscilloscope and a high impedance voltmeter which is capable of measuring 250 kHz (HP-400 or equivalent) to the erase bias test points for track 1 on the head assembly circuit board, as shown in Figure 4-4.

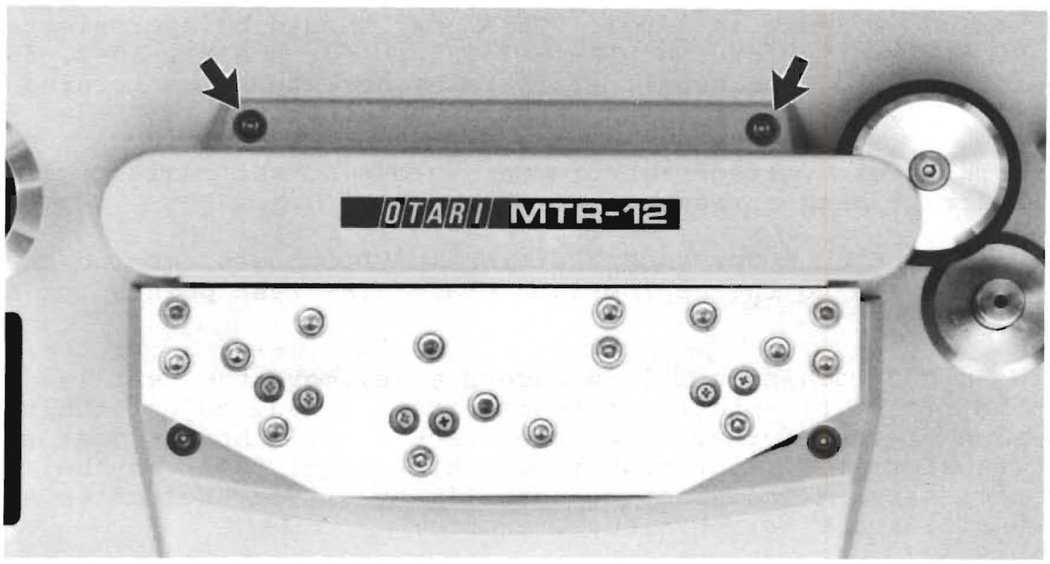


FIGURE 4-3. REMOVAL OF THE HEAD ASSEMBLY REAR COVER

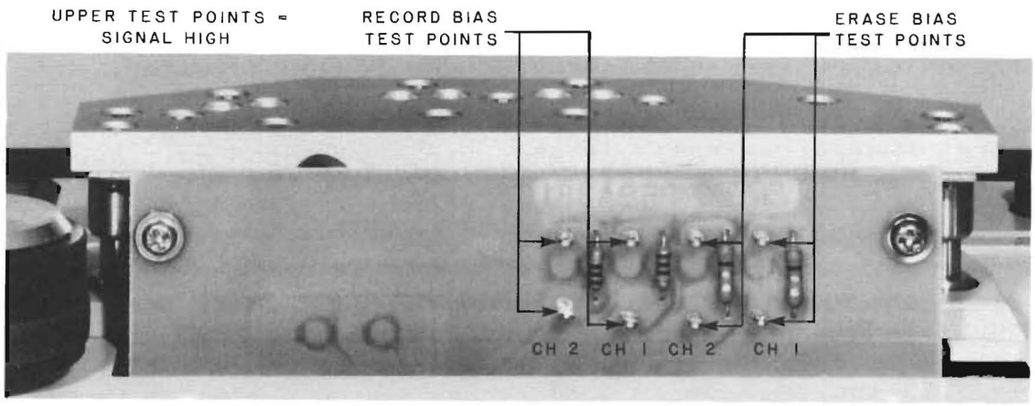


FIGURE 4-4. HEAD ASSEMBLY CIRCUIT BOARD BIAS TEST POINTS (NOTE: These test points are located on the circuit board at the rear of the head assembly, and this view is from the rear of the transport).

5. Set the meter on the 0.1 Volt scale and set the oscilloscope for 0.1 V AC per vertical division and 1 µS per horizontal division.

6. Place the machine in Record mode, and, using a non-metallic hex driver, adjust the tuning slug of transformer T2 on the AUDIO board (near the bottom rear corner of the board) for

maximum erase bias level. This peak should be approximately 86 millivolts for the MTR-10-2 (81 mV for the MTR-10-4, 55 mV for the old type head); if it is higher, turn the turning slug ccw until this bias level is obtained.

NOTE: This voltage measurement across a test resistor is an indirect bias current measurement.

7. Perform Step 6 for each additional AUDIO board, moving the test leads to the appropriate erase bias test points for that track.

8. With the machine still in Record mode, move the test leads to the record bias test points for track 1, and adjust tuning slug of transformer T1 of the track 1 AUDIO board (just above transformer T2) for peak record bias level. (It may be necessary to increase the sensitivity of your Voltmeter and oscilloscope for this measurement.)

9. While observing the oscilloscope, fine adjust the slug in transformer T1 so that the noise component riding on the bias sine wave is symmetrical.

10. Repeat Steps 8 and 9 for each additional track.

11. Stop tape, reinstall the head assembly rear cover, and remove the extender from the last AUDIO board you adjusted.

12. Set the MTR-10 TEST OSCillator for 10 kHz sine wave, set the SPEED control to "L", set the output selector switches to REPRO, set the MASTER BIAS I-II switch (SW3) on the AUDIO CONTROL board (E) to the "I" position, and place the transport in Record mode.

13. Disengage the INPUT SRL switches (buttons out), and adjust INPUT level control for a usable meter reading. Suggested levels are: 0 VU -- 15 and 30 ips; -10 VU -- 7.5 ips; and -20 VU -- 3.75 ips.

14. Adjust the BIAS trimmer (VR20) on the front of each AUDIO board for 3.8 dB overbias. (That is, turn VR20 clockwise until a peak output level is seen on the VU meters, then continue turning clockwise until the recorded level drops 3.8 dB.) On Low speed versions operating at 3.75 ips (= 9.5 cm/s) adjust for 7.5 dB overbias at an operating level of -20 VU. Overbias settings will differ for each formulation of tape. The figures given here are for 3M Scotch #226 Professional Recording Tape.

NOTE: The preceding Step not only adjusted the record bias for low speed operation, it also calibrated all audio boards so their bias levels will "track" when adjusted with the MASTER BIAS controls on the AUDIO CONTROL board. The follow-

ing few steps adjust the bias at other speeds by using master trimmers on the AUDIO CONTROL board.

15. Switch the SPEED control to "M", and adjust the MASTER BIAS I "M" trimmer (VR5) on the front panel of the AUDIO CONTROL board to obtain 2 dB overbias at 10 kHz. Note that this bias adjustment on the AUDIO CONTROL board simultaneously sets the "M" speed bias on all AUDIO boards.

16. Switch the SPEED to "H", and the MASTER BIAS I "H" trimmer (VR4) to obtain 1.2 dB overbias at 10 kHz.

NOTE: Future overall adjustments of record bias for "L" speed may be done with the MASTER BIAS I "L" trimmer (VR6) on the AUDIO CONTROL board.

NOTE: If you wish to calibrate the bias to a second tape formulation, set the MASTER BIAS I-II switch on the AUDIO CONTROL board to the "II" position, and adjust the MASTER BIAS II "L", "M", and "H" trimmers to obtain the same record/reproduce specifications by overbiasing at 10 kHz for the respective speeds. Unless an AUDIO board, the head assembly, or the tape formulation is changed, further adjustments of the individual BIAS trimmers on the AUDIO boards is unnecessary.

4.6.2 RECORD LEVEL ADJUSTMENT

The front panel INPUT level controls set the signal level from the selected line input or oscillator output, after a preamplifier stage in the AUDIO board. The REC LEVEL trimmer on the AUDIO board is the final level adjustment that comes after the AES and NAB or IEC equalization and the REC EQ stages. Once the REC LEVEL trimmers are calibrated, the front panel INPUT level controls may be used for real-time level adjustments.

1. Engage all INPUT and OUTPUT SRL buttons. Set the built-in TEST OSCillator for 1 kHz, and set the SPEED control to "H". Set the output selector switches in REPRO position, and place the machine in Record mode.

2. Adjust the REC LEVEL trimmer (VR16) on the front of each AUDIO board so the corresponding track's VU meter indicates 0 VU.

4.6.3 RECORD EQUALIZATION ADJUSTMENT

"H", "M", and "L" trimmers are provided on the front of each AUDIO board so that the high frequency RECord EQualization may be adjusted for optimum response at each of the three operating speeds.

It is assumed that tape is still threaded on the machine, the bias has been adjusted for the tape, and the LF COMP is Off.

1. Switch to the desired operating speed and adjust the corresponding REC EQ trimmer to meet the specifications for frequency response given on page 11-2.

2. Readjust the Record level according to the Procedure in Section 4.6.2, since the REC EQ adjustments just performed may have interacted with previous adjustments.

4.6.4 PHASE COMPENSATION

Adjustable phase compensation networks are provided for the record amplifier circuitry. These networks enable the circuit to be optimally compensated for group delay introduced by the record equalization circuitry, with separate adjustments for each of the three operating speeds. The result is superior transient and square wave response, as well as higher recording level capability with complex waveforms before saturation occurs.

The following procedure assumes that the bias, level, and equalization have been calibrated as per the previous instructions, and that LF COMP is switched Off.

1. Connect an oscilloscope to the LINE OUTPUT of one track.

2. Set the MTR-10 TEST OSCillator to 1 kHz square wave, set the operating speed to "L", and place the transport in Record mode.

3. Switching the output selector between REPRO and INPUT (or SEL-REP), adjust the L PHASE COMP trimmer (VR19) on the track's AUDIO board until the repro signal is most similar to the input signal. Refer to Figure 4-5.

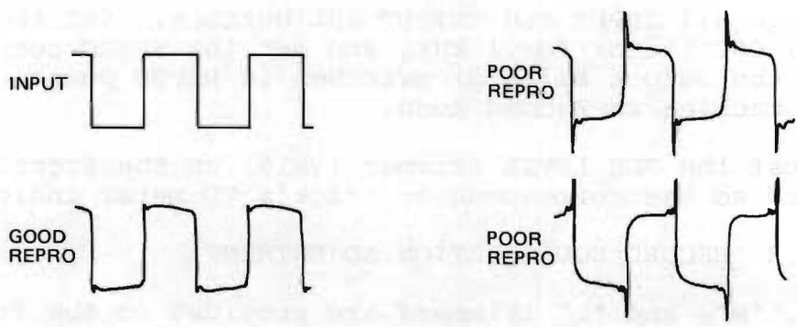


FIGURE 4-5. WAVEFORMS SHOWING PHASE COMPENSATION ADJUSTMENT

4.6.5 LOW FREQUENCY COMPENSATION (LF COMP)

Repeat the following procedure for each track.

1. Set the MTR-10 TEST OSCillator to 100 Hz, switch the output selector to REPRO position, and place transport in Record mode.

2. Move the LF COMP switch (SW1) on the track's AUDIO board to the On position, and adjust the LF COMP trimmer (VR6) until the appropriate Low Frequency response curve is obtained. Otari suggests -0.5 dB @ 100 Hz, 30 ips record/reproduce.

4.7 TIME CODE MODULE ALIGNMENT

4.7.1 HEAD ALIGNMENT

Azimuth Adjustment

1. Extend the TC module using an MTR-10/12 extender PCB (PB-76X).

2. Connect an AC voltmeter to CP 1 on the TC PCB.

3. Using the 1 kHz portion of the 7-1/2 ips, 250 nWb/m full track reproduce alignment tape, adjust the TC head "wrap" for peak output (best head to tape contact). Repeat using the 2 kHz and 4 kHz portions of the alignment tape.

   Observe the head wear pattern by inking the head and running marking tape across the head. The wear pattern must just cover the erase (left most) portion of the head gaps. It may be necessary to adjust, and re-ink the head several times for best adjustment.

4. Using the 500 Hz portion of the alignment tape, adjust the azimuth of the TC head for maximum output.

5. Repeat step 4 using the 1 kHz and 2 kHz portions of the alignment tape.

Head Height Adjustment

1. Connect a source of time code to the TC module Input, and record 1 or 2 minutes of time code.

2. Using magnetic developing fluid or a "magnetic viewer" to make the tracks visible, measure the track spacing and adjust the head height so that the track spacing conforms to the dimensions shown in Figure 4-6.

4.7.2 REPRODUCE ALIGNMENT

Reproduce Level Adjustment

1. Set the INPUT/SEL-REP/REPRO switch on the TC module to the REPRO position.

2. With the AC voltmeter still connected to CP 1, play the 1 kHz portion of the reproduce alignment tape.

3. Adjust the REPRO trimmer (VR 2) on the TC module front panel for 0 dBm on the voltmeter (approx. 2 Vp-p).

4.7.3 OUTPUT LEVEL ALIGNMENT

1. Feed SMPTE time code at + 4 dBm (or whatever Reference Level you have chosen), to the Time Code Input on the rear panel.

2. Connect an AC voltmeter to the Time Code Output connector on the rear panel.

3. Put the Time Code module into Record and record 1 or 2 minutes of time code.

4. Switch the Time Code module to Repro and playback the time code just recorded. Adjust VR 3 for + 4 dBm (or whatever Reference Level you have chosen), output.

4.7.4 RECORD ALIGNMENT

Bias Adjustment

NOTE: To adjust the Bias for the Time Code module it is necessary to adjust the bias for all the Audio channels first.

1. Set all BIAS trimmers on the front panel of the Audio Control PCB to the center of their range.

2. Adjust audio channel bias controls in accordance with the procedures described in page 4-10 of this manual.

3. Remove the head cover and connect an AC voltmeter and oscilloscope test leads to the Erase Current test points on the Head Assembly PCB as shown in Figure 4-7.

4. With the Time Code module in Record mode, but with no signal input, adjust the core of T2 on the Time Code module for a peak reading on the AC voltmeter. Continue to adjust, while observing the waveform on the oscilloscope for symmetry of the noise on the bias waveform. The voltage will be approximately 50 - 60 mV rms.

5. Connect the test probes to the Record Bias test points and repeat step 4, adjusting the core of T 1.

6. Adjust the BIAS trimmer (VR 4) on the Time Code module front panel for 10 mV rms.

   This sets the Time Code module bias to ONE of the MTR-10/12 bias settings. Changing the setting of the MASTER BIAS I/II switch or the Speed of the MTR-10/12 will require readjusting the Time Code module bias.

Input Level Adjustment

1. Reconnect the source of time code at +4 dBm (or whatever Reference Level you have chosen), to the Time Code input, switch the Time Code module to Input mode and put the MTR-10/12 into Record mode.

2. Adjust the INPUT trimmer (VR 1) on the time Code module front panel for +4 dBm at the Time Code Output.

LED Threshold Adjustment

1. Attach an AC voltmeter to pin 1 of IC37 (the anode of D26) and adjust VR 6 for +16 dBm. The Green LED should be illuminated and the Red LED should be dark.

2. Adjust VR 7 on the Time Code Module fully counter-clockwise.

Record Level Adjustment

1. Set the SPEED selector on the transport to M (15 ips) and connect a source of time code at +4 dBm to the Time Code INPUT.

2. Connect an AC voltmeter to CP 1.

3. Record 3 or 4 minutes of time code.

4. Rewind the tape and play the time code.

5. If the signal at CP 1 is less than 0 dBm then increase the setting of VR 8 on the time code P.C.B. slightly.

6. Repeat steps 3 through 5 until the voltage measured at CP 1 is 0 dBm.

7. Connect the oscilloscope to observe the waveform at CP 6.

8. While rewinding the portion of the tape containing the time code, press the CUE button, and adjust VR 5 until the waveform observed most closely resembles a square wave. (This is not a critical adjustment and may only affect the Module's ability to read code at Wind speeds.)

Fine Adjustment of Delay Time

1. Thread the MTR-10/12 with a 15 ips, full track time code tape, recorded at 250 nWb/m.

2. Connect the output of audio channel 1 to the channel 1 input of a 2 channel digital storage oscilloscope. Connect the Time Code Module Output to the channel 2 input to the oscilloscope.

3. Set the controls on the oscilloscope so that both signals are displayed, and the sweep is triggered by the CH 1 input.

   NOTE: The oscilloscope must be either a dual-beam unit or be placed in Chop mode rather than Alternate, so that the time relationship between the two signals can be observed.

4. While playing the tape containing time code in Repro mode, adjust SW 6 according to Table 1 so that the delay remains within 0.5 bit.

5. While playing the tape containing time code in Sel-Rep mode, adjust SW 5 according to Table 2 so that the delay remains within 0.5 bit.

   Do not adjust SW 4.

Alternate Method if a Digital Storage Oscilloscope is not available but a Synchronizer capable of displaying the error between master and slave code is available.

1. Connect the Output of audio channel 1 to the Master time code input of your synchronizer.

2. Connect the Time Code Module Output to the Slave time code input to the synchronizer.

3. Play the 15 ips full track time code tape.

4. With both the Audio Channel and the ZA-55H Time Code module in Repro mode, adjust SW 6 until the synchronizer displays 0 subframes of offset.

5. Repeat step 4 with both Audio Channel and Time Code MODULE IN SEL-REP MODE adjusting SW 5.

   NOTE: A non-correctable error greater than 2 subframes may indicate errors in head wrap or head gap centering adjustment.

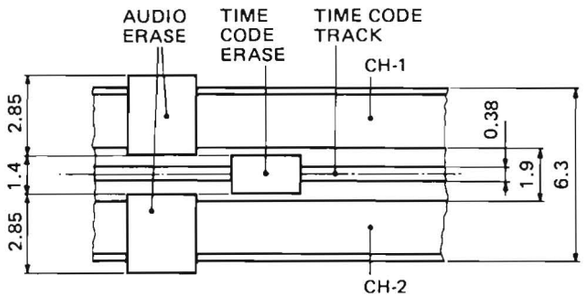

AUDIO ERASE
TIME CODE ERASE
TIME CODE TRACK
CH-1
CH-2
2.85
1.4
2.85
0.38
1.9
6.3

Fig. 4-6

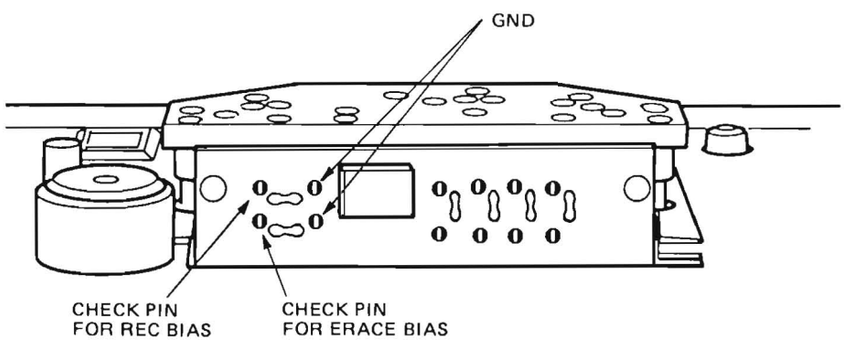

GND
CHECK PIN FOR REC BIAS
CHECK PIN FOR ERACE BIAS

Fig. 4-7

5

SECTION 5

TRANSPORT ALIGNMENT

5.1 GENERAL DESCRIPTION

This section of the manual covers electronic and mechanical adjustments which affect MTR-10 performance. Many adjustments are seldom, if ever, necessary, such as those for the brakes, head lifters, and servos. Other adjustments, such as head azimuth, will be necessary when playing tapes made on other recorders. Whether or not maintenance seems to be needed, it is a good practice to check all adjustments periodically. The schedule will depend on the amount and type of use to which the MTR-10 is subjected, but we would recommend a minimum of once every 6 months or 2,000 hours of operation, whichever comes first.

This section is conceptually organized with mechanical adjustments first, then electronic (or electro-mechanical) adjustments.

5.2 HEAD GEOMETRY

The MTR-10 record and repro heads are mounted so they hang below a head assembly block which is supported from the main deck plate by standoffs. A single hex-head screw adjusts the azimuth (left-right tilt) of each head, without affecting the zenith (forward-back tilt), wrap (penetration of the head into the tape path) or head height. This system makes it possible for Otari to factory preset the zenith, wrap and height so that no further field adjustments are required. The only adjustment recommended is for azimuth, which maintains maximum phase coherence across the various tracks of the heads, and ensures optimum high frequency response between record and repro heads.

Azimuth adjustment was covered in Section 4.5, Steps 4 through 10. The essential point is that the MTR-10 azimuth is not aligned the same way one aligns conventional tape machines. Because there is phase compensation, the record head azimuth cannot be accurately adjusted by looking at the repro head output while recording a test tone. Instead, one must play a tone from an alignment tape (or a calibration tone on a program tape), and independently adjust the repro head azimuth and the record head azimuth (in Sel-Rep mode) for phase coherence between the outermost tracks. When both heads are adjusted for optimum playback from the same tape, they are adjusted to match one another.

5.3 ACCESS TO THE UNDERSIDE OF THE MTR-10 TRANSPORT DECK PLATE

The transport is attached to the cabinet by a pair of hinges, one on each side near the rear of the unit, and secured by a pair of latches, one on each side near the front of the unit. To gain access to the transport, press in both release buttons. The

transport will pop up about an inch due to the force of a spring loaded shock absorbing post. Then lift the transport up as far as it will go (nearly vertical), and let it down; two self-latching support arms will hold the transport open. For testing and adjustment purposes, the system may be operated with the transport open. Two levers on each side of the transport panel provide the same function for the MTR-12. These levers are shown in the picture. If the levers are pulled upward the transport will "pop-up" about half inch. The transport can then be opened in the same manner as the MTR-10.

To close the transport, first lift it all the way up, which releases the support latches, then carefully let it down until it rests on the spring-loaded shock absorbing post. Push down on the front of the transport until the side latches engage.

5.4 CAPSTAN PINCH ROLLER SOLENOID TRAVEL (& PRESSURE)

The MTR-10 pinch roller is actuated via a dual solenoid system. (Refer to figure 5-1.) In fast winding modes, the pinch roller moves farthest away from the capstan. In stop mode, the smaller solenoid is used to position the pinch roller near the capstan so that, when the machine goes into play or record, the required distance of pinch roller travel will be minimized. When the machine is actually placed in play or record mode, the larger solenoid pulls the pinch roller against the capstan. This 2-stage technique minimizes shock to the tape as well as any physical noise that might be caused by the pinch roller moving into operating position.

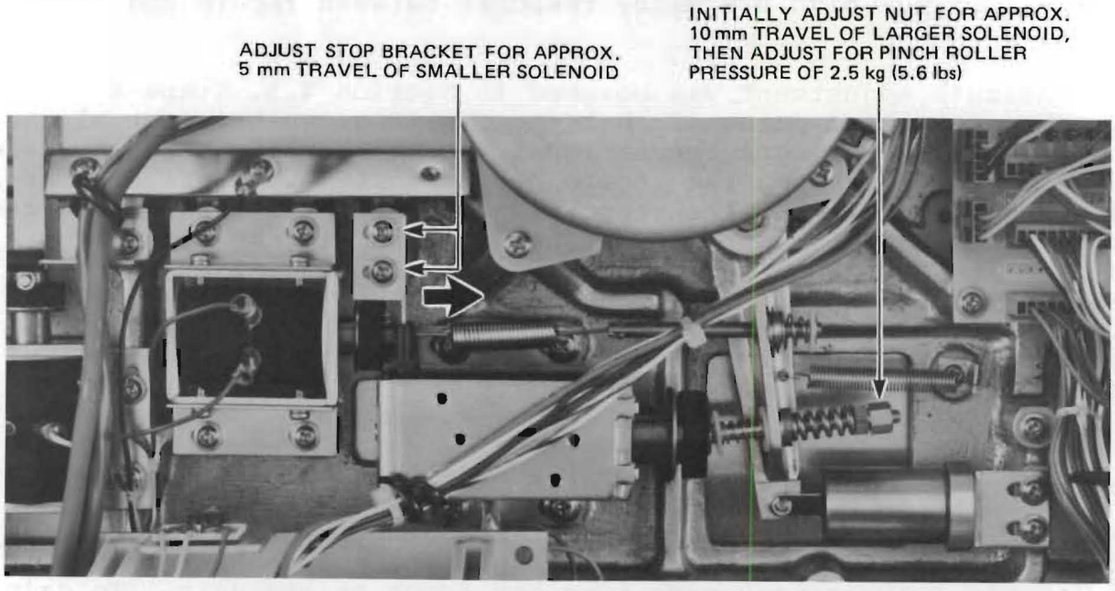


FIGURE 5-1. PINCH ROLLER SOLENOIDS & ADJUSTING POINTS

1. Without tape, open the transport and check the travel of the smaller solenoid. The plunger will be resting against the stop bracket; push the plunger into the solenoid body, and measure the travel. It should be about 5 mm. If not, loosen the two philips head screws which secure the solenoid stop to the deck plate, slide the stop bracket as required, and tighten the screws.

2. Similarly, check the travel of the plunger on the larger solenoid. It should be about 10 mm. If not, loosen the outer lock nut on the solenoid plunger extension, and adjust the inner nut to increase or decrease travel. (Refer to figure 5-1.) Do not tighten the lock nut as yet.

3. The preceeding adjustments are nominal. Now close the transport, remove the two allen-head screws securing the head assembly rear cover, lift off the cover, and thread a tape.

4. Press PLAY, then STOP/LOAD. Check the clearance of the pinch roller to the tape; it should be 1 mm minimum, 2 mm maximum. If necessary, open the transport, adjust the position of the smaller solenoid, close the transport, and recheck clearance by pressing PLAY and STOP/LOAD.

5. Make a 1 foot or larger loop with a piece of twine, and attach one end to a spring scale. Place the other end of the loop over the pinch roller, so it is threaded around the shaft at the bottom of the pinch roller. Hold the scale and twine to the rear so that the twine just clears the space between the two reels. (Refer to figure 5-2.)

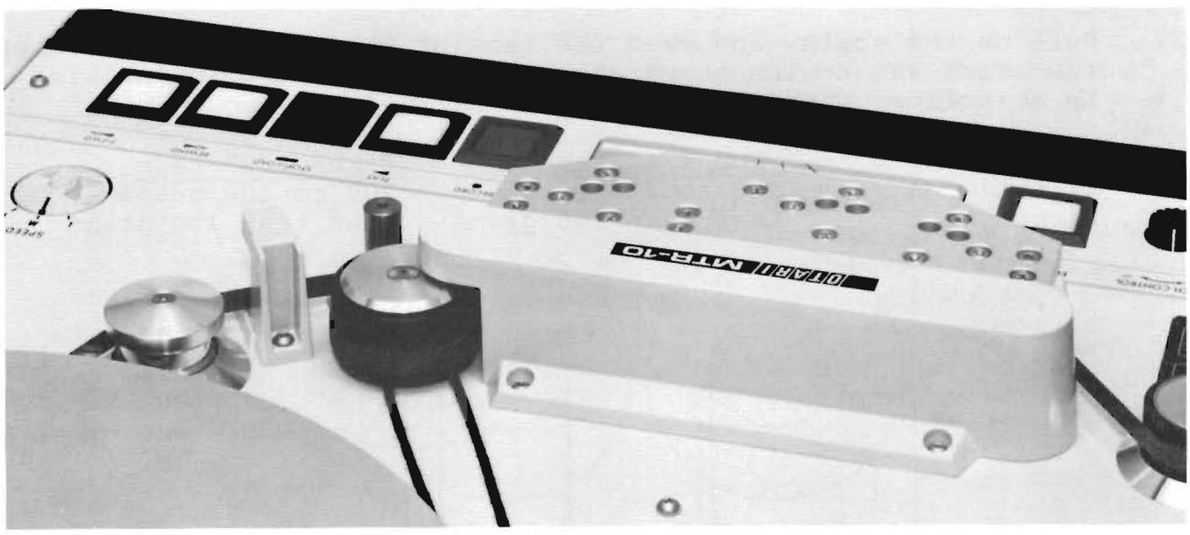


FIGURE 5-2. MEASURING PINCH ROLLER TENSION
(A spring scale is attached to the other end of the twine.)

6. Place the transport in play mode, and pull on the spring scale to check the pinch roller pressure. It should take about 2.5 kg (2,500 grams), or about 5.6 pounds of pressure to cause the pinch roller to just begin to move away from the capstan. (Excessive pressure may overcome the solenoid and completely move the pinch roller out to fast winding position).

7. If necessary, turn the larger solenoid's adjusting nut to change the tension, and, when it is approximately 2.5 kg, secure the adjustment by tightening the lock nut.

5.5 BRAKE TORQUE

The mechanical brakes come into use only when tape is unloaded or when the power is turned off (at which point the brakes serve as tape spill protection). The brake on each reel motor consists of a metal band and bonded felt pad which wrap around a disk on the bottom of the motor. The brake bands are spring loaded to wrap tightly around the disk, stopping the motor shaft (and the reel turntable). When the transport is placed in play, record, spooling or fast winding modes, a solenoid loosens the band to release the brake. Braking is differential (more in one direction of rotation than the other). It can be adjusted by loosening or tightening the brake bands.

1. Prior to making any adjustment, check the brake tension on both the supply and takeup reels, both with and against the primary direction of travel. The power should be Off.

2. (Refer to figure 5-3.) In order to measure the tension, attach a length of string to a spring scale, and wrap several turns of the string around an empty reel on the reel table.

3. Pull on the scale, and read the tension when the reel overcomes the brake and begins to rotate smoothly. The tension should be as follows (again, see figure 5-3):

	For 1/4" tape	For 1/2" tape
Direction A	150 to 225 grams	200 to 300 grams
Direction B	Less than 100 grams	Less than 100 grams

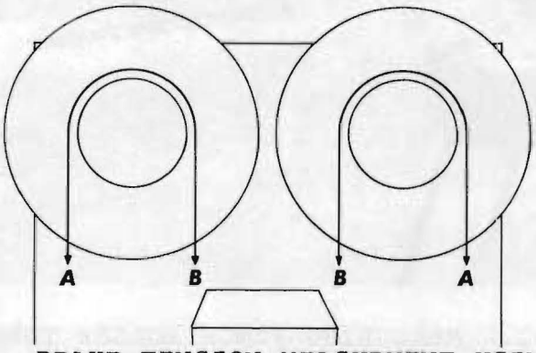
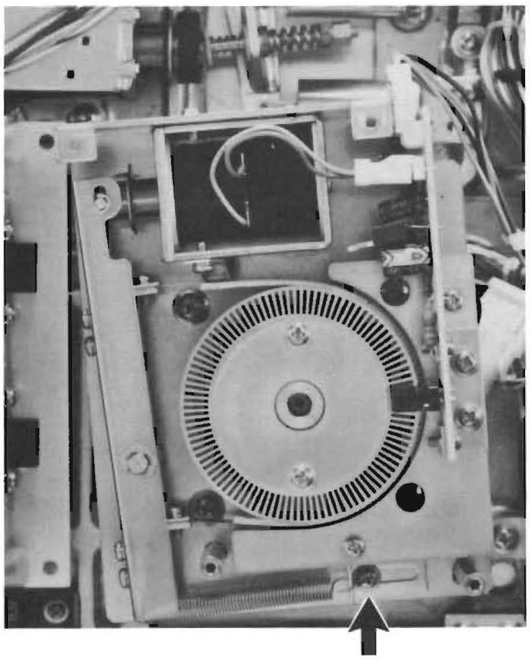


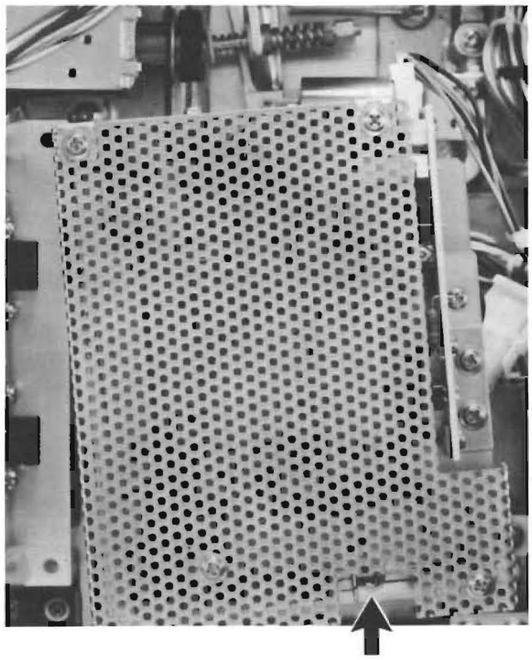
FIGURE 5-3. BRAKE TENSION MEASURMENT USING A SPRING SCALE

4. If the tension is significantly beyond the ranges listed, it will be necessary to adjust the brake band. Unlatch the transport plate and lift it up. Then, beneath the reel motor needing brake adjustment, locate the bracket which holds the brake band tension spring. (Refer to figure 5-4.) If you look closely, you will see that the bracket, which is secured by a single philips head screw, is accessible without removing the perforated steel cover below the motor.

5. Loosen the screw which secures the brake band spring retaining bracket, and slide the bracket toward or away from the band to decrease or increase tension. Then tighten the screw and re-check the tension as per Step 3 above. One basically adjusts for back tension (direction A), and then checks to see that forward tension (direction B) is below 100 grams.



A) This view clearly shows the spring retaining bracket below the reel motor tach disk. However, it is neither necessary, nor recommended, to actually remove the perforated steel cover from the motor assembly to adjust the brake band.



B) This is the same motor pictured to the left, but with the cover in place. Note a cut-out provides access to the screw which secures the brake spring retaining bracket.

FIGURE 5-4. SPRING RETAINING BRACKET FOR BRAKE TENSION ADJUSTMENT

5.6 REEL TURNTABLE HEIGHT

The reel turntable height must be set so that the tape path from the reel to the guides and head assembly is straight and flat. The reel turntable actually consists of three main pieces, an inner support hub, a spindle assembly screwed to that hub, and a cover plate with rubber anti-skid pad also screwed to the hub.

1. Remove the three larger philips-head screws which secure each reel turntable cover plate to its inner support hub/ spindle assembly. Be sure to lift out and retain the three split lock washers.

2. Unlatch and lift up the transport. Then, from below, reach into the reel turntable area and push out each turntable cover plate, which should drop into your other hand on the top of the transport. This exposes the support hub/spindle assembly, the motor shaft, and the motor mount bracket. (See figure 5-5).

3. Close the transport, measure the height from the top of the supply or takeup motor mount bracket to the top of the reel turntable support hub; it should be 33.5 mm (figure 5-5). If necessary, loosen both hex head set screws which secure the support flange to the motor shaft, slide the hub up or down to obtain the correct height, and retighten the set screws on the flats with symmetrical torque.

4. Place the reel turntable cover plates back in position, and secure each with the three philips head screws and split washers.

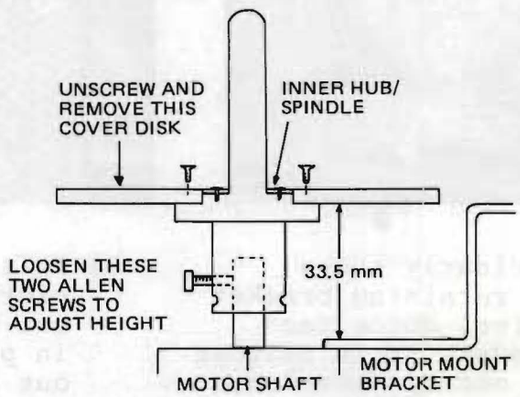


FIGURE 5-5. REEL TURNTABLE HEIGHT ADJUSTMENT

5.7 TAPE LIFTERS

(Refer to figure 5-6.) The two tape lifters are linked together and are thus adjusted at the same time. Unlatch the transport and lift it up for access to the adjustment.

1. Thread tape on the transport, and, with power Off, or in stop mode, check the clearance between the tape lifters and the tape. They should be between 1.5 and 2.5 mm behind the tape. If they are too close to the tape, loosen the two screws on the lifter solenoid stop bracket, and slide the bracket toward the front of the transport so the lifters retract further (or vice-versa if there is too much clearance).

2. Place the transport in fast wind mode, and check to ensure the tape is not in contact with any of the three heads. If it is, the lifter solenoid will have to be moved toward the rear of the chassis. Stop tape, loosen the four screws which hold the solenoid brackets to the underside of the deck plate, and move the solenoid back slightly. Recheck lifter clearance during fast winding; there should be 2 mm between the erase head and the tape.

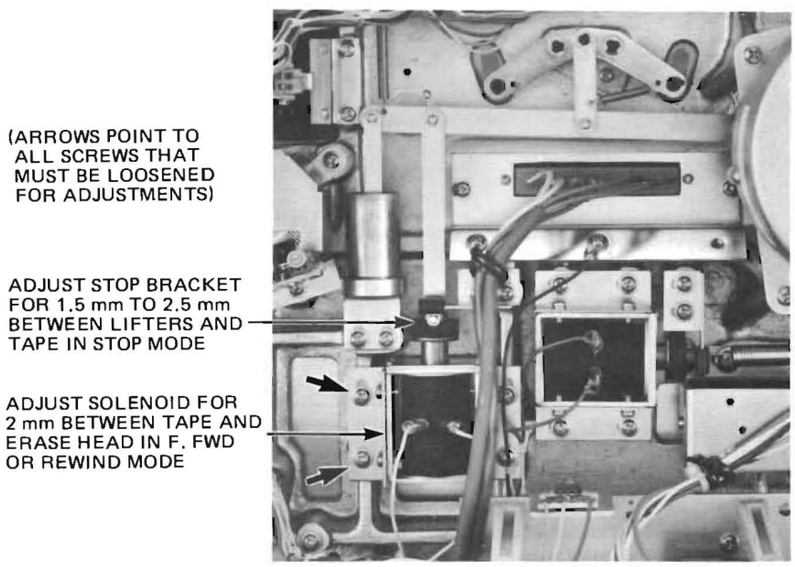


FIGURE 5-6. TAPE LIFTER ADJUSTMENTS

5.8 SUPPLY AND TAKEUP REEL TENSION AND SPEED ADJUSTMENTS

Some reel tension adjustments are made using a special test mode program built into the microprocessor on the MTR-10 MASTER CPU board. In the test mode, the microprocessor commands the reel servo system to develop a standard amount of torque via a D-to-A converter located on the REEL CONTROL board.

5.8.1 SUPPLY REEL TENSION

1. Enter test mode by using a small screwdriver or alignment tool to press in the recessed TEST button on the front of the MASTER CPU board. The RUN LED on the board should then turn from green to red (amber indicates a fault).

2. Attach a string to a spring scale, and wind it onto the supply reel (an NAB hub) as shown in figure 5-7.

3. Press the REWIND (<) button. Alternately pull and partially release the scale so the reel can move a bit, and observe the average tension; it should be about 350 grams for 1/4" tape (400 grams for 1/2" tape). This is equivalent to a torque of about 2 kg/cm.

4. If necessary, adjust the SUPPLY GAIN trimmer (VR5) on the front of the REEL CONTROL board (C), once again pulling and releasing the spring to check for 350 grams average tension for 1/4" tape (400 grams for 1/2" tape). Clockwise rotation of the trimmer increases the tension. When tension is correct, press STOP.

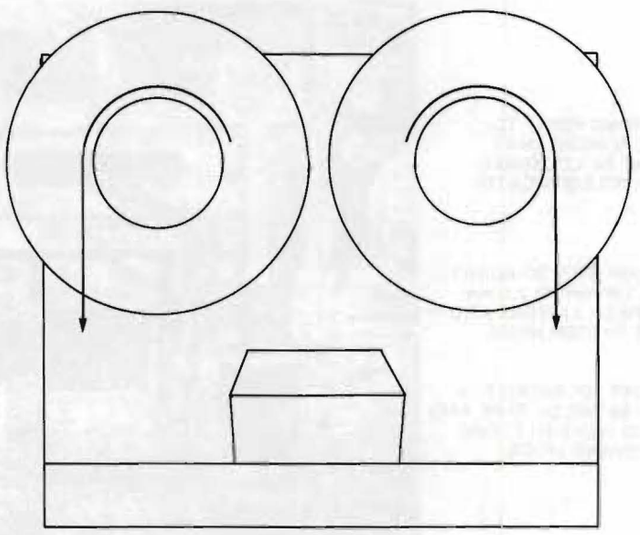


FIGURE 5-7. MEASURING SUPPLY AND TAKEUP REEL TENSION

5.8.2 TAKEUP REEL TENSION

1. With the transport still in the test mode (per 5.8.1), attach the spring scale to the takeup reel as shown in figure 5-7.

2. Press FAST FORWARD (<), check for 350 grams tension for 1/4" tape (400 grams for 1/2" tape), and adjust T.UP GAIN (VR10) on the REEL CONTROL board as may be required.

3. Press STOP/LOAD. Exit the test mode by again pressing the TEST button on the MASTER CPU board and verifying the RUN LED turns green again.

5.8.3 ZERO SEARCH SLOW SPEED CRAWL

This adjustment is not critical. It adjusts the "crawl" speed during the final portion of zero search mode (when tape is wound to within 1 second of its destination).

1. Turn power Off. Remove the REEL CONTROL board, install the extender board, and plug the REEL CONTROL board onto the extender, and turn power On.

2. Thread tape on the transport, wind it a few seconds, and press RESET on the counter. Then fast wind forward for about 4 minutes.

3. Press the STOP/LOAD button, and then press the SEARCH ZERO button. When the tape slows down and the time readout is nearing 1 second, observe the crawl speed.

4. The crawl speed should be about 3-3/4 ips. Adjust trimmer VR1 (near the middle of the REEL CONTROL board) as required to obtain this crawl speed. (Refer to figure 5-8.)

5.8.4 FAST WIND SPEED

Note that adjusting the fast wind speed will also affect the spooling mode speed. Too slow a speed is inconvenient, but avoid setting the unit for too fast a speed, as the guide roller flywheels will take too long to stop.

1. The fast wind speed should be about 300 ips. With a 1200 foot reel, this amounts to a 50 second wind time (or 100 seconds for 2400 feet).

2. If the wind time is substantially different, adjust trimmer VR2, at location L-8 of the REEL CONTROL board for "B" lot and later machines.

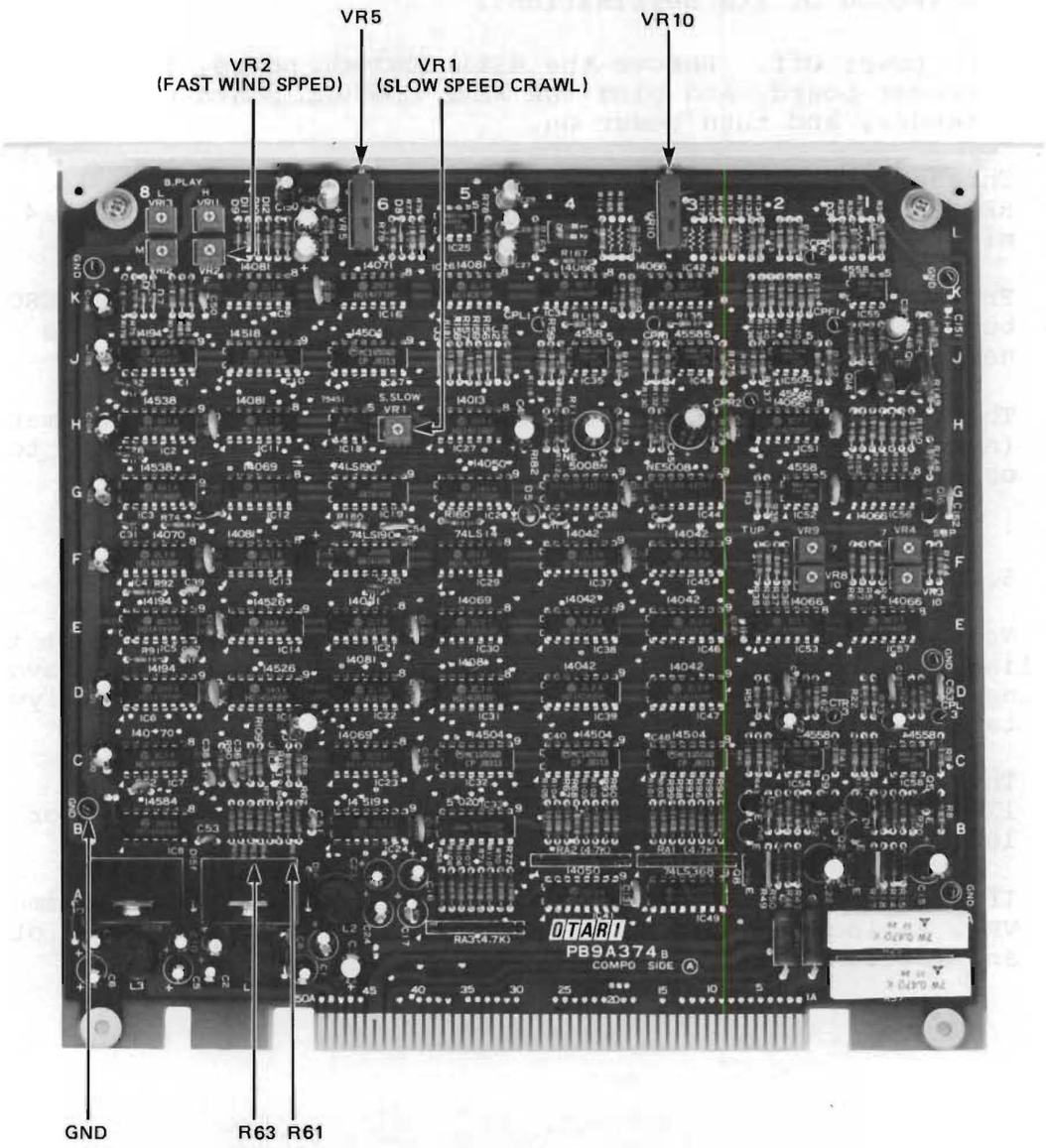


FIGURE 5-8. REEL CONTROL BOARD INTERNAL ADJUSTMENTS AND TEST POINTS

5.9 TACHOMETER PHASE

It is possible that pressing the STOP/LOAD button will not cause tape to stop. Proper adjustment of the tachometer phase prevents "servo runaway."

1. Turn Off the MTR-10 (and extend the REEL CONTROL board if it is not already extended).

2. Connect a dual trace oscilloscope to test points (two resistors) on the REEL CONTROL board. These resistors are roughly located in figure 5-8, and shown in detail in figure 5-10). Connect the upper scope trace (channel 1) to R61, and the lower scope trace (channel 2) to R63, with the connections made to the side of the resistors closest to the edge of the circuit board.

3. Connect the oscilloscope ground lead to any nearby GND test point(s) on the same circuit board.

4. Set the scope to the 5 V DC range, and set it so it triggers from channel 1 (e.g., the upper trace derived from R61).

5. Turn On the MTR-10, load tape on the transport, and place the unit in play mode.

6. Observe the scope (you are watching the tach photo interrupter output). The lower trace (square wave) should lead the upper trace by 90° (Refer to figure 5-9). If this is not the case, you will need to physically adjust the position counter tachometer board.

   NOTE: In FAST FORWARD (>) mode, the 90° lead is similar; in reverse play or REWIND (<), the lead becomes a 90° lag.

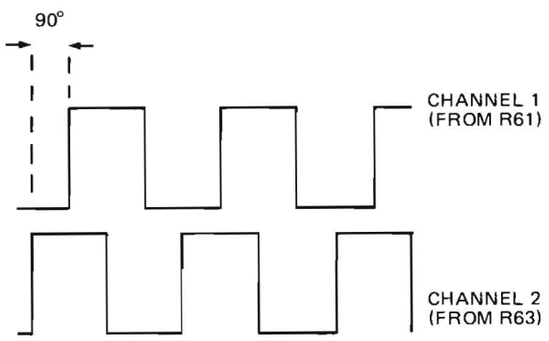


FIGURE 5-9. CORRECT TACHOMETER OUTPUT IN PLAY MODE

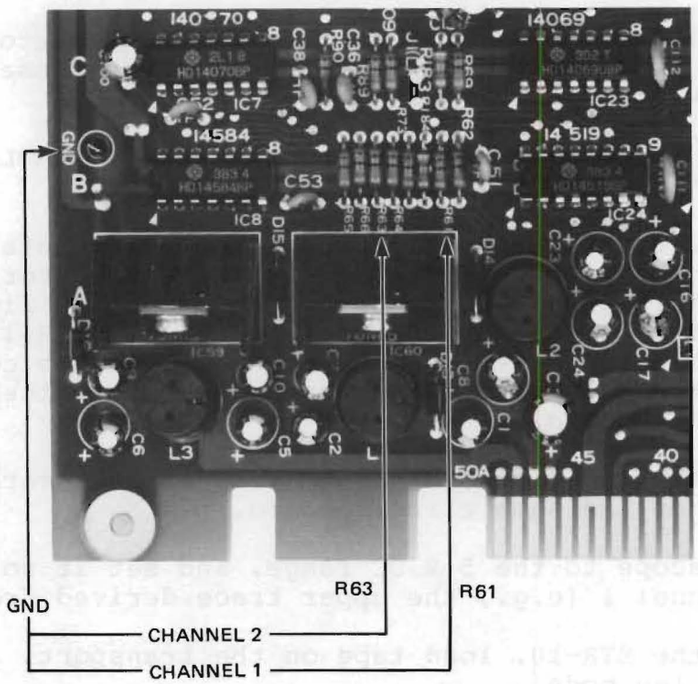


FIGURE 5-10. TEST POINTS ON REEL CONTROL PCB FOR TACH PHASE CHECK

7. If adjustment is called for, unlatch the transport and tilt it up. Find the counter tachometer board (below the tach roller as shown on figure 5-11).

8. Using an insulated shaft screwdriver (to avoid shorting the tach board and burning up op-amps), loosen the right-hand mounting screw that holds the board to the deck plate.

CAUTION

NEVER USE A SCREWDRIVER NEAR THE TACHOMETER DISK ITSELF. THE DISK IS EASY TO WARP IF TOUCHED, AND ANY WARP WILL CAUSE EXCESSIVE JITTER.

9. Pivot the tach board out (away from the tach disk) or in to obtain the proper phase lag on the oscilloscope display.

10. Tighten the right-hand mounting screw, re-check the scope, and close the transport.

11. After step 10, VR1 and VR2 are to be adjusted for a 50% duty cycle on each photocell amplifier output.

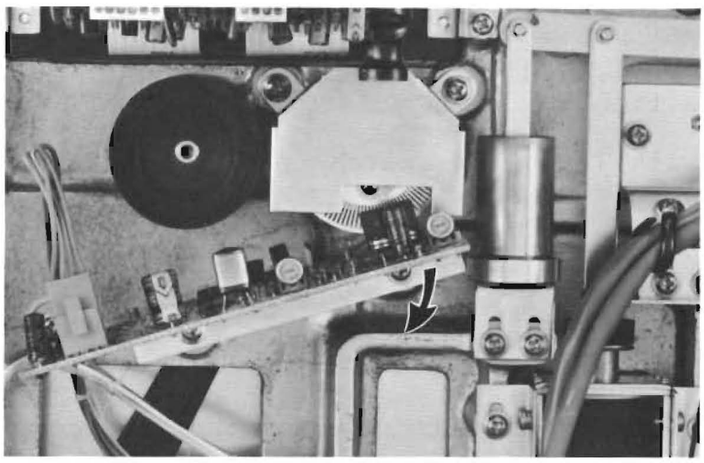


FIGURE 5-11. COUNTER TACHOMETER BOARD ON UNDERSIDE OF TRANSPORT

5.10 REVERSE PLAY SPEED AND REEL MOTOR DRIVE AMPLIFIER (MDA) GAIN

Reverse play speed is crystal controlled, although not phase locked, therefore it will vary from one end of the reel to the other. The procedure which follows sets up the most accurate average reverse play speed, but should not be considered a precision calibration. Adjustment of the Reverse Play trimmers will not affect the normal operation of the machine. A frequency counter is required.

1. Load a 7" reel of tape on the transport (with an empty 7" reel for takeup). Wind tape until an equal amount of tape is on the supply and takeup reels.

2. Connect a frequency counter to the LINE OUTPUT of track 1.

3. Extend the REEL CONTROL board for the following adjustments.

4. Press RESET to zero the tape counter for reference.

5. Set the built-in test oscillator for a 1 kHz sine wave. Check the frequency counter to verify the actual frequency of this tone (and make a note of the precise frequency).

6. Be sure the SPEED MODE switch is set to FIX position.

7. Disengage the INPUT 1 SRL button, and, with the track 1 monitor switch in the INPUT position, adjust the INPUT control for 0 VU on the track 1 VU meter.

8. Set the operating SPEED to "L", enter Record mode, and record

about 30 seconds of the 1 kHz tone.

9. Set VR11, VR12, and VR13 on the REEL CONTROL board to their center position.

10. Set the track 1 monitor switch to REPRO position and enter Reverse Play mode.

11. Observe the frequency counter to determine whether the output during reverse play is at the same speed used during recording. (Also observe for enough time to verify that the frequency of the output tone is reasonably stable.)

12. If necessary, adjust trimmer VR4 on the REEL CONTROL board until the output frequency matches the frequency of the oscillator during record.

    NOTE: If speed instability or oscillation occurs during Reverse Play operation at "L" speed, with nearly empty 7" supply reel, (as evidenced by swing arm jitter), decrease the setting of VR4 until the instability disappears.

13. Set VR9 to match the position of VR4.

14. Set the operating SPEED to "M", enter Record mode, and record about 30 seconds of the 1 kHz tone.

15. Repeat Steps 10 and 11, and if necessary, adjust VR12 until the output frequency matches the frequency of the oscillator during record.

16. Set the operating SPEED to "H", enter Record mode, and record about 30 seconds of the 1 kHz tone.

17. Repeat Steps 10 and 11, and if necessary, adjust VR11 until the output frequency matches the frequency of the oscillator during record.

THIS COMPLETES THE ADJUSTMENTS REQUIRING THAT THE REEL CONTROL BOARD (C) BE EXTENDED. TURN POWER OFF, AND REMOVE THE EXTENDER BOARD.

5.11 CAPSTAN CONTROL BOARD (D)

There are several CAPSTAN CONTROL board adjustments, some of which are accessible from the front panel. However, required test points are on the circuit board (Refer to figure 5-12). Remember to turn Off power prior to extending the board.

5.11.1 CAPSTAN GAIN

The gain is separately adjusted for low, medium, and high operating speeds using the front panel L GAIN, M GAIN, and H GAIN trimmers.

1. Connect an oscilloscope to CP2 (check point #2) near location H2 on the CAPSTAN CONTROL board. The scope ground lead can be attached to one of the nearby GND terminals on that board. Set the scope for 5 Volts per division.

2. Turn power On, and place the transport in either Stop or Play mode, with the SPEED control set to "H" position.

3. Look at the scope waveform; it should be a square wave with a 50% duty cycle. If not, adjust the H GAIN trimmer (VR7) on the front of the CAPSTAN CONTROL board.

4. Switch the transport to "M" speed, and again check the scope; if necessary, adjust M GAIN (VR8) for a 50% duty cycle.

5. Switch the transport to "L" speed, and again check the scope; if necessary, adjust L GAIN (VR9) for a 50% duty cycle.

5.11.2 CAPSTAN DAMPING

Damping is not a particularly critical adjustment, although excess damping can cause noise modulation of the capstan speed. The object is to obtain minimum jitter on the oscilloscope waveform, while retaining servo lock of the capstan.

The damping is separately adjusted for low, medium, and high operating speeds using the front panel L DAMP, M DAMP, and H DAMP trimmers on the CAPSTAN CONTROL board.

1. Connect the oscilloscope to CP13 at the bottom of the CAPSTAN CONTROL board (near location H8), and use any nearby GND terminal for the scope ground lead. Set the scope to 0.5 Volts per division vertical sensitivity, for DC input.

2. Wash your hands (or wear gloves) so that when you grasp the capstan you do not soil it or get finger oils on it.

3. Set the transport in Stop mode, and at "L" SPEED.

4. Using finger pressure, hold and then release the capstan. Note the recovery time to a stable waveform (and the time that

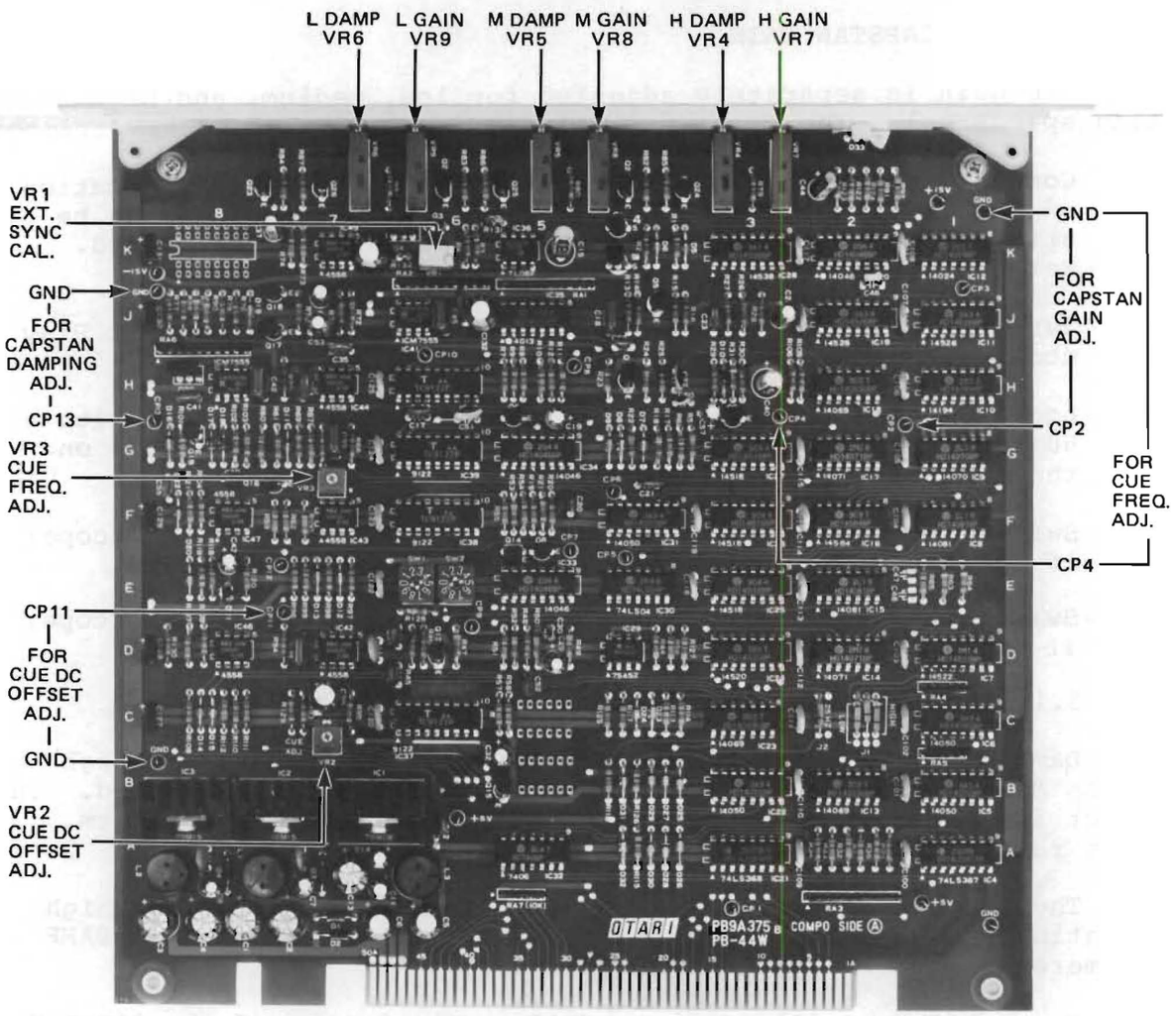


FIGURE 5-12. CAPSTAN CONTROL BOARD CHECK POINTS AND ADJUSTMENTS

it takes the CAPSTAN LOCK LED on the CAPSTAN CONTROL board to return to green from red).

5. The recovery to servo lock should occur within four "jogs", or less, of the scope waveform (or in less than two seconds time).

6. If damping is not within spec, turn the L DAMP trimmer (VR6) counterclockwise until the capstan just "unlocks" (CAPSTAN LOCK LED turns red). Then turn the trimmer about one full turn clockwise from the point of unlock, or until the waveform jitter seen on the scope is minimized, and capstan lock is re-established.

7. Re-check damping as per step 4. You can also check for proper damping by alternately switching between Play and Stop modes, and observing the CAPSTAN LOCK LED. It should remain green.

8. Repeat steps 4 through 7 at "M" and "H" speeds, adjusting the M DAMP trimmer (VR5), and the H DAMP trimmer (VR4) respectively.

5.11.3 EXTERNAL SYNC INPUT CALIBRATION

This adjustment calibrates the variable speed oscillator (VSO) so that the "% speed" display is accurate when either an external signal or the MTR-10 variable pitch control is used in lieu of fixed speed mode. The adjustment may be done at any time, although the MTR-10 should have been turned On for at least 10 minutes.

1. Make sure nothing is plugged into the MTR-10 PARALLEL I/O or AUTO LOCATOR connectors.

2. Turn the MTR-10 speed display On by depressing the SPEED DISPLAY button.

3. Set the MTR-10 display so it shows "%" speed.

4. Set the MTR-10's SPEED MODE switch to EXT position.

5. Locate VR1 on the CAPSTAN CONTROL board (behind the L GAIN trimmer), and adjust it for "100%" indication on the speed display.

5.11.4 CUE LEVER OFFSET AND MAXIMUM SPEED

This procedure adjusts the offset, so that tape will be stopped when the cue lever is centered, as well as the frequency,

which affects the maximum tape winding speed achieved when the MTR-10 CUE lever is deflected fully to the right or left.

1. Connect an oscilloscope to CP11 (check point #11) near location E-7 on the CAPSTAN CONTROL board. The scope ground lead can be attached to one of nearby GND terminal on that board. Set the scope for 1 Volt per division sensitivity (DC). (A voltmeter may be substituted for the oscilloscope).

2. Thread a clean, well packed tape on the transport and wind until approximately the same amount of tape is on each reel.

3. The CUE lever should be centered, with the transport in Cue mode.

4. Operate the CUE lever fully in one direction, then the other, and then release it. The scope trace should deflect equal amounts, then return the center. If not, there is DC offset which must be corrected. Adjust VR2 near location C-7 on the CAPSTAN CONTROL board to eliminate the offset. Tape will be stopped when the CUE lever is centered (in Cue mode) if VR2 is properly adjusted.

   NOTE: If a voltmeter is used instead of an oscilloscope, check for correct adjustment by observing equal voltages at both CUE lever extremes, with 0 Volts when the CUE lever is centered. A further check is done by moving the CUE lever to the left until tape just begins to move, then to the right until tape just starts to move; when equal deflection is required to both sides, VR2 (offset) is properly adjusted.

5. Connect a frequency counter to CP4 near location H-3 on the CAPSTAN CONTROL board.

6. Move the CUE lever fully to the left, then fully to the right, observing the frequency counter. The frequency should be about the same when the lever is fully deflected to either side. If not, readjust VR2. (This may change the DC offset slightly, but it should remain near zero, and some offset is acceptable.)

7. Fine adjustment of the frequency is done with trimmer VR3 near location G-7 on the CAPSTAN CONTROL board (the frequency counter should still be connected to CP4). With the CUE lever fully deflected to one side the frequency should be about 10 kHz.

   NOTE: Due to interaction, you may have to readjust both VR2 and VR3 to obtain equal frequency readings at full left and full right deflections of the CUE lever.

   NOTE: If you do not mind slightly slower maximum Cue winding speed, smoother operation can be obtained by adjusting VR3 for

a lower frequency, down to about 8 kHz instead of 10 kHz.

THIS COMPLETES THE ADJUSTMENTS ON THE CAPSTAN CONTROL BOARD. TURN POWER OFF AND REMOVE THE EXTENDER BOARD.

6

SECTION 6

OPERATION

6.1 GENERAL

The following procedures assume that the MTR-10 has been installed and checked for proper functions, as per Sections 2 and 3, and that it has been properly aligned as per Sections 4 and 5 of this manual. It is further assumed that a suitable mixing console, monitoring system, and any other ancillary equipment are ready for recording and playback, and that the MTR-10 power is On.

We recommend situating any optional Remote Control Box, such as the CB-102 (formerly designated the CR-705A) or the CB-111, or the optional CB-109 Auto Locator, in a convenient location near the mixing console. Refer to figure 6-1 for Remote Box features, and figure 6-2 for MTR-10 Transport features. The Auto Locator is discussed in Section 7.

If the equipment is not handy when reading this manual, refer to the illustrations in Sections 1 and 3.

CAUTION

The reel motors are capable of delivering substantial torque, and could present a danger if hands or clothing become entangled in the reels or tape path. Please be careful when working in the vicinity of the transport. If you wear a necktie, remove it, tuck it into your shirt, or make sure it is clipped out of the way. Similarly, secure or remove any other loose clothing or jewelry.

6.2 RECORDING INITIAL TRACKS

1. Thread a blank reel of tape on the transport, and take up the slack by hand-turning the takeup reel counterclockwise.

2. Select the desired TAPE SPEED ("H", "M" or "L"). Unless there is some special application, you should set the SPEED MODE switch to FIX(ed) position.

3. Zero the tape time counter by pressing RESET (or do this after step 7 below).

4. Apply signal to those inputs of the MTR-10 corresponding to the tracks you wish to record.

5. Set the output selector switches (INPUT/SEL-REP/REPRO) to INPUT position (the yellow LEDs above the switches will be On).

6. Push up the record mode (READY/SAFE) switch to READY position on the track or tracks you wish to record. The LEDs above those switches will flash.

7. You may choose to engage the MTR-10 INPUT SRL buttons and then adjust the mixing console buss outputs to program levels of 0 dBm to +4 dBm nominal so that the MTR-10 VU meters peak no higher than -4 to 0 dB. The peak indicator LEDs should only flash occasionally, if at all.

   Alternately, you can set the mixing console buss outputs for a nominal output level, disengage the MTR-10 INPUT SRL buttons, and adjust the INPUT controls for the same -4 to 0 dB peaks on the MTR-10 VU meters.

   NOTE: Because the MTR-10 offers an astonishing 78 dB signal-to-noise ratio, it should not be necessary to use any external noise reduction system. However, if a linear compander noise reduction system is in use (i.e., dbx*), the meter deflection on the MTR-10 will be less than that on the console's meters due to the encoding process.

8. Before recording program, it is a good practice to record a series of reference tones at the head of the tape for later use (e.g., playback alignment on this or other tape machines). You can use the 1 kHz, 100 Hz, and 10 kHz sine waves from the built-in test oscillator. If a Dolby* noise reduction system is being used, also record Dolby test tone (generally, the test tones themselves should not be encoded with noise reduction).

   NOTE: You should be monitoring the output of the tape machine. Since the tape machine output selector switches are set to INPUT position, you will actually be listening to the buss output of the mixing console.

9. When you are ready to record, press the PLAY and RECORD buttons on the MTR-10, the Auto Locator, or the Remote Box. The READY/SAFE LEDs will stop flashing and instead remain On, indicating the selected tracks are recording.

10. To cease recording on all tracks, press the STOP/LOAD button or the PLAY button. To cease recording on one track while tracks while continuing to record on another (or others), move that track's record mode switch down to SAFE position.

6.3 PLAYBACK OF INITIAL TRACKS

1. Rewind the tape. (You can automatically return to the beginning by pressing the SEARCH ZERO button).

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* dbx is the registered trademark of dbx, Inc., Waltham, Mass. Dolby is the registered trademark of Dolby Laboratories Licensing Corporation, San Francisco, Calif.

2. Move all the record mode switches down to SAFE position to prevent any possibility of inadvertent erasure should the record button accidentally be pressed.

3. Set the output selector switches of all recorded tracks to REPRO position (the orange LEDs above the switches will be On).

4. Press the PLAY button to roll tape, and adjust the listening level in one of two ways:

   a) Engage the MTR-10 OUTPUT SRL buttons, and adjust the monitor level at the mixing console, or

   b) disengage the MTR-10 OUTPUT SRL buttons, and adjust the MTR-10 OUTPUT level controls.

   You should be listening to the previously recorded tracks.

5. Press the STOP/LOAD button. If you wish to record an additional track (or tracks), see Section 6.4 below.

6.4 SEL-REP RECORDING (OVERDUBBING)

The intent of Sel-Rep recording is to monitor a previously recorded track (or tracks) while simultaneously recording one or more additional tracks. To avoid the time delay between the record head and the reproduce head, the previously recorded track(s) are played back from the record head.

This technique is primarily used in multi-track tape machines, and is certainly applicable to the MTR-10-4. However, the MTR-10-2 is provided with Sel-Rep capability for convenience in alignment, and for those applications which require 2-track overdub capability, such as audio visual productions involving a mono program and a cue track.

A variation of Sel-Rep recording involves an insert (punch-in) of new material to replace or add onto a previously recorded track. This method is discussed in Section 6.5.

NOTE: For rehearsal of an overdub, see Section 6.6.

1. Place all output selector switches in SEL-REP position (the green LEDs above the switches will be On).

2. For those tracks to which you wish to add new material, set the record mode switch to READY position (red LED flashes).

3. For those tracks you wish to protect from recording (i.e., the previously recorded tracks), set the record mode switch to SAFE position (red LED is Off).

NOTE: When tape is stopped, you will be monitoring the output of all tracks, which, since tape is not moving, is equivalent to no signal. As soon as tape is placed in REPRO mode, you will be monitoring the input to all tracks.

4. Press the PLAY and RECORD buttons to begin the overdub. You will now be monitoring the input of the track (or tracks) being recorded, and the previously recorded signal from the tape (via the record head and Sel-Rep circuitry) of any track which is in SAFE mode.

   NOTE: The green LED above the output selector switch of any track being recorded will turn Off, and the yellow one will turn On, indicating that you are monitoring the input rather than the record head output. Also, the red LED above that track's record mode switch will now be On steady, while the LED above any track set to SAFE position will begin flashing.

6.5 SEL-REP RECORDING (PUNCH-INS)

This technique permits you to play and monitor all tracks of the tape, including the track upon which you will be recording. At the instant you punch-in (begin recording), the monitoring of the track(s) being recorded switches from the tape (via the record head and Sel-Rep circuitry) to the input signal.

NOTE: For rehearsal of a punch-in, see Section 6.6.

1. Set all output selector switches to SEL-REP position (green LEDs above the switches are On).

2. For those tracks on which you wish to punch-in (make an insert), set the record mode switch to READY mode (red LED above the switch flashes).

3. For those tracks you wish to protect from recording, set the record mode switch to SAFE position (red LED is Off).

   NOTE: When tape is stopped, you will be monitoring the output of all tracks, which, since tape is not moving, is equivalent to no signal.

4. Press the PLAY button. You will now be listening to all recorded tracks via the record head and Sel-Rep circuitry.

5. At the instant you wish to make the punch-in, press the RECORD button. The track(s) set to READY mode will be recording, and you will now be monitoring the input of that track (or tracks) along with the previously recorded signal from the

tape of any track (or tracks) which is in SAFE mode.

NOTE: The green LED above the output selector switch of any track being recorded will turn Off, and the yellow one will turn On, indicating that you are monitoring the input rather than the record head output. Also, the red LED above that track's record mode switch will now be On steady, while the LED above any track set to SAFE mode will begin blinking.

NOTE: There is a very brief delay from the instant you press the RECORD button to the initiation of recording, due to the gapless punch-in feature. Still, it is best to punch in on a track at a moment that comes between notes, or during a drum beat or sharp accent on another track, so that no gap is heard.

6. To end the punch-in:

   a) If you wish to end the insert, but continue monitoring the tape for a second punch-in, press the PLAY button.

   b) If you are done with punch-ins for now, press the STOP/LOAD button. After tape is stopped, move all record mode switches to SAFE position to prevent accidental erasure of any material.

6.6 REHEARSAL OF OVERDUBS OR PUNCH-INS

In the overdub and punch-in procedures discussed in Sections 6.4 and 6.5, there was no way to monitor the new input signal on the track(s) to be recorded unless the machine was actually recording. It may be desirable to do "dry runs." That is, to rehearse the overdub or punch-in by playing previously recorded tracks through the record head and Sel-Rep circuitry, and by monitoring the input of tracks on which you will be recording. The method is explained here.

1. Place all tracks' record mode switches in SAFE position (red LEDs are Off).

2. When rehearsing overdubs, on those channels on which you wish to make the overdub, move the output selector switch to INPUT position (amber LED above the switch is On).

3. For all other channels of an overdub (or for rehearsing a punch-in), set the output selector switch to SEL-REP position (green LED above the switch is On).

4. To rehearse an overdub, press the PLAY button. You will now be monitoring the input of all rehearsal tracks, and playback from the record head on other tracks. To end the overdub rehearsal, press STOP/LOAD.

up to the tape manufacturers) so Otari still recommends storing a tape tails out. However, we have provided a feature that will save you time in that you no longer have to wait for a tape to play to the end just to store it tails out.

The special feature is called "spooling mode," and it is a modified version of fast forward or rewind whereby the tape is wound at roughly 120 ips. Tape pack is nearly identical to that obtained during normal play, but you can get there in about 1/4 of the time required at 30 ips play speed.

1. Spooling mode can be entered from any tape mode (play, fast forward, rewind, record or stop).

2. To spool tape onto the takeup reel, simultaneously press the EDIT/UNLOAD and FAST FORWARD buttons.

3. To spool tape onto the supply reel, simultaneously press the EDIT/UNLOAD and REWIND buttons.

4. To exit spooling mode, press any of the tape motion buttons (PLAY, STOP/LOAD, F.FWD, or REWIND).

   NOTE: If you wish to hear the program while spooling, press down the CUE button. The transport will remain in spooling mode, and the tape lifters will be retracted as long as CUE is held down. Once again, we refer you to the caution statement in Section 6.9 regarding high frequencies damaging monitor speakers.

6.11 HAND SPOOLING

The MTR-10 servo system is highly refined. It permits the operator to turn either the supply or takeup reel by hand, and it will automatically "track" that motion with the other reel so as to maintain constant tape tension. In order to find an exact cue point on a tape, one could press the CUE button and use the CUE lever. However, it is also possible to simply place the transport in stop mode (press STOP/LOAD), and to then hand-turn either reel to find the cue point. In stop mode, the tape lifters are retracted and the audio output is not muted, so it will be possible to hear the signal as the tape passes the repro head (output selector switch in REPRO position) or the record head (output selector switch in SEL-REP position).

6.12 DUMP EDIT

When editing a tape to delete a portion of a program, it may be convenient to cut the tape at the beginning of the segment

to be deleted, then play through or hand wind the unwanted segment off of the supply reel, and finally, upon locating the end of the unwanted segment, to stop tape and perform a splice. The MTR-10 EDIT/UNLOAD button is provided for this purpose. The procedure is described below.

1. Place the output selector switches in REPRO position.

2. Find the beginning of the segment you wish to cut out of the tape by normal play or fast winding with the CUE button depressed. After stopping the tape, manually rock the reel to ensure the tape is "parked" at the exact edit point.

3. Use a grease pencil and make a small mark on the back of the tape at the center of the REPRO head.

   NOTE: If you are removing only a short segment of tape (less than a foot), play the tape until you reach the second edit point. Then mark it as above, and continue.

4. Press the EDIT/UNLOAD button once to release the servo tension on the tape. That button will begin flashing to indicate that the unit is in edit mode, and that servo tension is no longer being held.

5. Pull the tape away from the heads, lay it in the splice block, and make a cut at the marked edit point.

6a. There are two ways to spool off (dump) tape. If you are removing a short segment of tape (per the note in Step 3, pull tape from the takeup reel until you reach the beginning edit mark, then cut and splice the tape. Re-thread the tape, and press STOP/LOAD to cancel edit/unload mode. (You're done).

6b. If you are removing a longer segment of tape, and have therefore already cut the beginning edit point, thread the tape from the supply reel back through the head assembly, and hold the tape end so tape is in position to be clamped by the capstan and pinch roller.

7. Press the PLAY button. Tape will play, and the end will spill off the machine as it passes the capstan. Note that the takeup reel does not turn. When you reach the second edit point, press STOP/LOAD.

8. You can hand hold the "free" end of tape just to the right of the capstan, and rock the supply reel to ensure the tape is "parked" with the edit point directly in front of the REPRO head. Then mark the edit point with a grease pencil.

9. Pull the tape into the splicing block, cut it, and splice it to the other end (if necessary). As soon as you re-thread the tape so it holds in the safety switch, edit/unload mode

is automatically cancelled.

6.13 USE OF VARIABLE SPEED MODE

The SPEED MODE switch may be set to VAR (variable) position, allowing the tape speed to be adjusted for recording or playback variation over at least a ±20% range (±2 tones, approximately). The adjustment is made with the adjacent PITCH CONTROL. Variable speed can be used to "tune up" new or old tracks during overdubs, to bring a song into a vocalist's range, to squeeze or stretch a program to fit a specific time requirment, or for special effects.

1. Enable the speed display by pressing the SPEED DISPLAY button on the MTR-10.

2. Set the SPEED MODE switch to VAR position.

3. You may adjust the speed by turning the PITCH CONTROL knob clockwise or counterclockwise (it is a 5-turn pot).

4. You can read the selected speed in either of two ways:

   a) When the transport is turned On, its speed display is set to show the speed as a percent of the selected SPEED (L, M or H), as indicated by the red LED adjacent to the "%" symbol on the right of the display.

   b) Press the "ips-%" button, and the display will show the actual speed in inches per second, as indicated by the red LED adjacent to the "ips" symbol on the right of the display. (Another press of the "ips-%" button returns the unit to "percent of nominal speed" readout.)

6.14 USE OF AN EXTERNAL SPEED REFERENCE

An external clock (reference oscillator) can be used to control the speed of the MTR-10 capstan motor, or an external resistor can be used to vary a voltage and similarly control the MTR-10 capstan motor speed. When the SPEED MODE switch is set to EXT position, a suitable input signal must be applied to the PARALLEL I/O connector. (PARALLEL I/O is a 37 pin connector on the MTR-10 rear panel, and it also includes input terminals for record, play, rewind, fast forward and cue modes for use by external synchronizers.) The nominal reference frequency at which a synchronizer connected to the PARALLEL I/O input will drive the capstan to the set record/play speed (7.5, 15 or 30 ips) is 9,600 Hz; changing the frequency will change the capstan speed. If voltage control is used rather than frequency, a variable resistor can be wired to the AUTO LOCATOR connector on the MTR-10 rear panel, providing a ±20% speed variation.

If the MTR-10 is set to EXT position and the unit does not sense an appropriate input signal at its PARALLEL I/O connector (between 3 kHz and 20 kHz), logic will automatically cause the MTR-10 to maintain the same speed it would have if the SPEED MODE switch were in FIX position. (Internal adjustment may be required: see Section 5.11.3.)

For a BTX SHADOW or Model 4700 SMPTE time code synchronizer, only the MTR-10 PARALLEL I/O input is used. However, one resistor change on the MTR-10 CAPSTAN CONTROL circuit board may be required. In addition, it will be necessary to add a diode to the MTR-10 TRANSPORT CONTROL board and to either substitute one IC on that board. Many other synchronizers, such as those made by Audio Kinetics and Adams-Smith, may also be used. (See the subsequent paragraphs for additional hookup information.)

6.15 USING SMPTE SYNCHRONIZATION AND/OR LOCATION CONTROL

6.15.1 GENERAL

SMPTE is an acronym for the Society of Motion Picture and Television Engineers. The SMPTE time code is a standard digital coding technique for identifying the location of an audio or video tape; coding is done in hours, minutes, seconds, and frames (24 frames/sec. for film or 30 frames/sec. for video). A time code generator is used to record SMPTE code onto one track of the tape. A time code controller can then read the code from two or more tape machines, and, by servo-controlling the reel motors of those machines, bring them to specific cue points. A time code synchronizer further controls the capstan motors to keep the machines running synchronously. These techniques can be used to obtain more tracks of recording (two or more audio machines "synched" together), to mix audio in sync with video or film images, to make complex edits by transferring material from one or more audio machines to another, and so forth.

6.15.2 CONNECTING A SYNCHRONIZER TO THE MTR-10

Generally speaking, the manufacturer of a SMPTE time code controller or synchronizer will provide interface information for use with the MTR-10. Otari works very closely with those manufacturers to ensure that they have the information needed, and to do everything possible to ensure that our equipment will operate satisfactorily with a variety of manufacturers' products. We have detailed a typical hookup to the BTX SHADOW synchronizer because this popular unit requires a minor MTR-10 modification. We have also included interface information for two other popular synchronizer units, the Audio Kinetics "Q-Lock" and the Adams-Smith Model 2600.

The MTR-10 provides signals to the synchronizer (via the PARALLEL I/O connector) which indicate its speed (a tachometer output signal), the direction of tape travel, and a reference power supply. Also, tally signals indicating the MTR-10 mode (play, stop, rewind, fast forward, and cue) are given to the synchronizer so it knows current transport status. Inputs on the same PARALLEL I/O connector are provided for status commands from the synchronizer (play, stop, rewind, fast forward, and cue = lifter defeat). Also, as described in 6.14, there is an input for a capstan drive reference frequency signal from the synchronizer so that the actual play/record speed can be varied to maintain synchronization. The pin assignments of the PARALLEL I/O are given by the table on pages 6-20 and 6-21.

6.15.3 INTERFACE OF THE OTARI MTR-10 TO THE BTX SHADOW

Figure 6-3 illustrates the cable which is required to interface the BTX SHADOW (Model 4700) synchronizer's TRANSPORT CONTROL connector with the MTR-10 PARALLEL I/O connector. Figure 6-4 shows the minor modification which is required on the MTR-10 TRANSPORT CONTROL circuit board. To interface the MTR-10 to most synchronizer units, you must perform the following steps:

1. There is a timing fault on the output of the SHADOW which can result in the MTR-10's reverse play mode being unintentionally enabled. This can be solved by trying an R/C circuit to the rewind command line, as illustrated in the interconnect cable diagram (Figure 6-3).

2. Check to ensure that resistor R22 at location G-4 on the Capstan Control board has been changed from 220 Ohms to 680 Ohms (1/4 Watt). This is necessary because of the relatively high output impedance of the SHADOW.

3. Adjust the capstan speed control range, per the instructions in the BTX SHADOW manual, for a range of 50% to 200% of normal play speed. Use the "speed %" display on the MTR-10 to assist in this adjustment.

   NOTE: If the external sync signal is less than 40% of normal play speed (i.e., a frequency below 3,800 Hz), the MTR-10 automatically switches to its internal frequency reference. This means that adjusting the lower limit VR on the SHADOW will have no effect once the range drops below 40%!

4. The "lifter defeat" and "cue" commands are enabled simultaneously when the cue command on the PARALLEL I/O connector is enabled. This is a problem with the BTX SHADOW because it puts out a lifter defeat command even when the transport

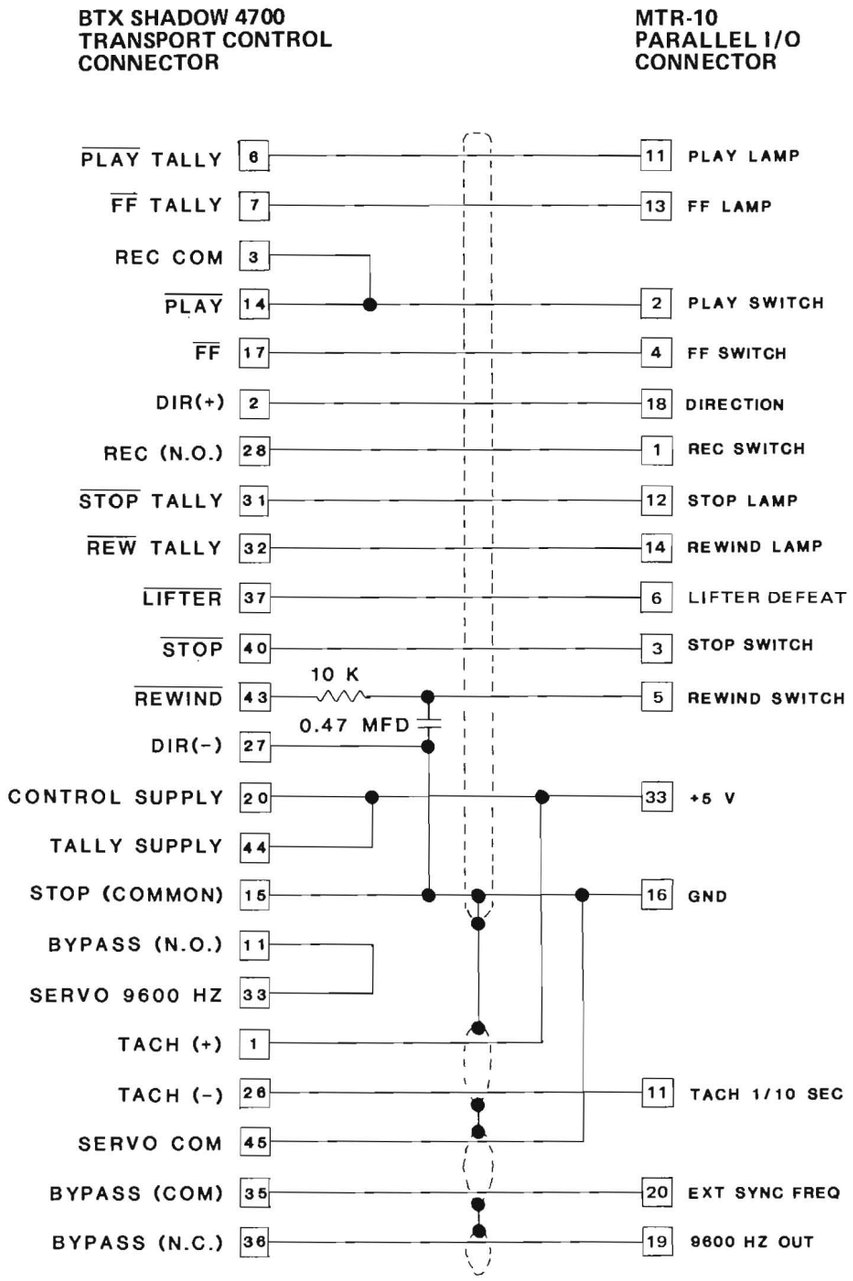


FIGURE 6-3. DETAILS OF INTERFACE CABLE FOR MATING BTX SHADOW (Model 4700) WITH MTR-10/MTR-12

is in Play mode. (Remember that when the cue command is active, the MTR-10 output level is automatically attenuated 6 dB to 10 dB, something you don't want during Play mode.)

To avoid this unwanted muting, it is necessary to separate the lifter defeat from the cue command line. This is most easily accomplished by cutting a wire inside the MTR-10 that is attached to pin 6 of the PARALLEL I/O connector. Then run a new wire from that pin, with an isolation diode (1N914 or any similar switching diode), to the base of switching transistor Q6 on the TRANSPORT CONTROL board.

Refer to Figure 6-4. One suggestion for accomplishing the diode modification is to solder the diode between the base of Q6 (where it joins R39, C15, and D14) and a spare pin on the TRANSPORT CONTROL board (such as pin 31). Then attach a wire from the point on the mother board opposite that pin (e.g., pin B31) on the TRANSPORT CONTROL board to pin 6 of the PARALLEL I/O connector.

To accomplish this modification, there is another easier way. Instead of attaching a new wire from the mother board to pin 3 of the EXT SYNC connector, using a sharp tool such as a scribe, extract the female pin from pin 3 (the third pin from the top) of connector body of CN60 so that the pin can be reinserted into another connector. Reinsert this female pin (with wire attached) into vacant position 7 (the third position from the bottom) of connector body CN15. All connector pin numbers count from the top of the connector.

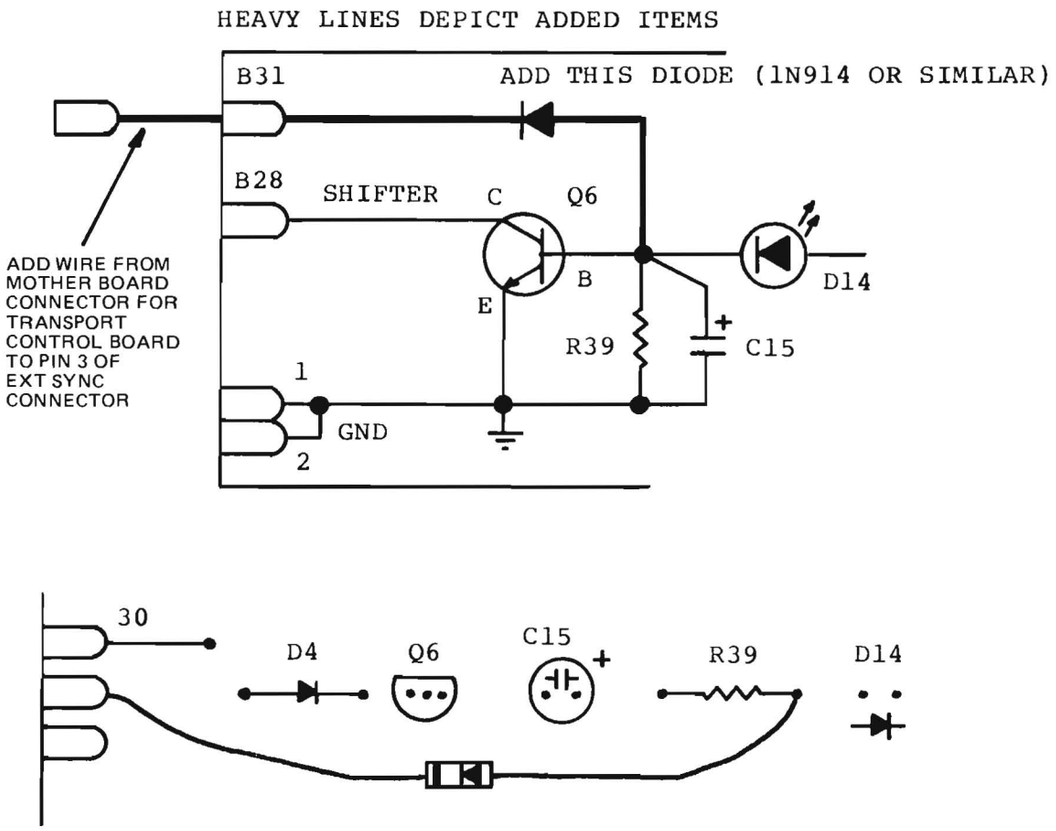


FIGURE 6-4. ADDING A DIODE TO MTR-10 TRANSPORT CONTROL BOARD (BOARD A) FOR PROPER MUTE/UNMUTE OPERATION

Circuit schematic (top), pictorial view of diode wiring on rear of TRANSPORT CONTROL PCB (middle), and corresponding area of actual PCB (bottom).

6.15.4 INTERFACE OF THE OTARI MTR-10 TO AUDIO KINETICS "Q-LOCK" SMPTE SYNCHRONIZERS

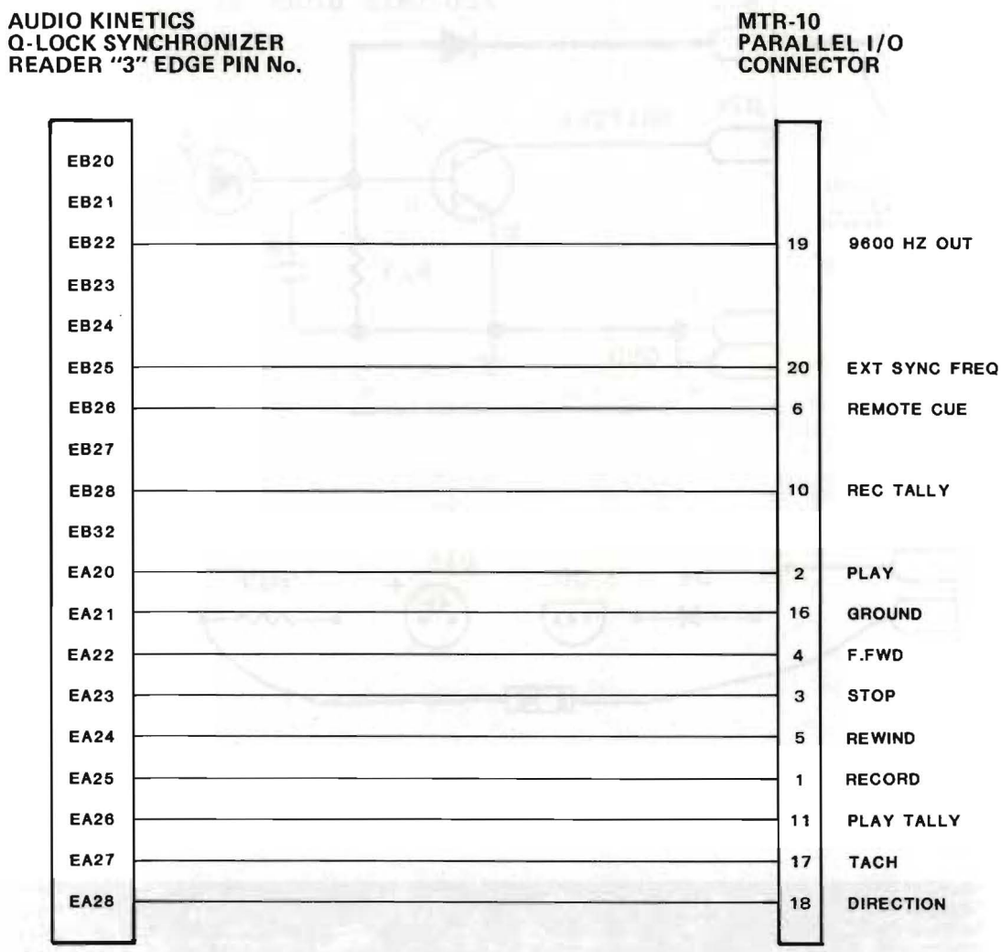


FIGURE 6-5. DETAILS OF INTERFACE CABLE FOR MATING AUDIO KINETICS "Q-LOCK" SYNCHRONIZER WITH MTR-10/12

NOTES:

1) For proper external control of the MTR-10 capstan motor, a resistor change is necessary on the CAPSTAN CONTROL board (board "D"). Change resistor R22 to a 680 Ohm 1/4 Watt resistor.

2) Proper lifter defeat operation may require the diode modification described on page 6-12 (Step number 4) of this manual.

6.15.5 INTERFACE OF THE OTARI MTR-10 TO ADAMS-SMITH 2600 SMPTE SYNCHRONIZERS

Figure 6-6 (on the page 6-19) illustrates the cable which is required to interface the Adams-Smith Model 2600SY Tape Synchronizer with the MTR-10 PARALLEL I/O connector. The modifications shown for the BTX and Audio Kinetics synchronizers are not necessary for operation with the Adams-Smith unit, but if the modifications have been made, they will not affect the operation of either the MTR-10 or the synchronizer.

The following Notes apply to Figure 6-6 on the page 6-19.

NOTES:
1. Typical Form C relay contact.
2. Typical transistor switch output.
3. This connector optional when Slave LTC Reader is used; otherwise not required.
4. This connector not required when Slave LTC Reader is used.
5. This connector not required when Master LTC Reader is used.
6. 0 Vdc indicates Reverse.
7. 40 pulses/sec at 15 ips.
8. Either relay or transistor switching may be used for Stop, F.Fwd, Rew, and Play commands and Lifter Defeat function.
9. Use relay switching only for Capstan switch over. (Synchronizer bypass).
10. Set FM frequency to 9600 Hz.

The information regarding interface with other manufacturer's equipment (such as synchronizers) has been provided by the manufacturers.

Suggested Constants for use with the MTR-10:

CONSTANT	VALUE	FUNCTION
01	6	FM Freq. Set
02	25	Lock Servo
03	23	FM Freq. Set
04	08	FM Freq. Set
10	1	Cueing/Parking
31	28	Tach Rate

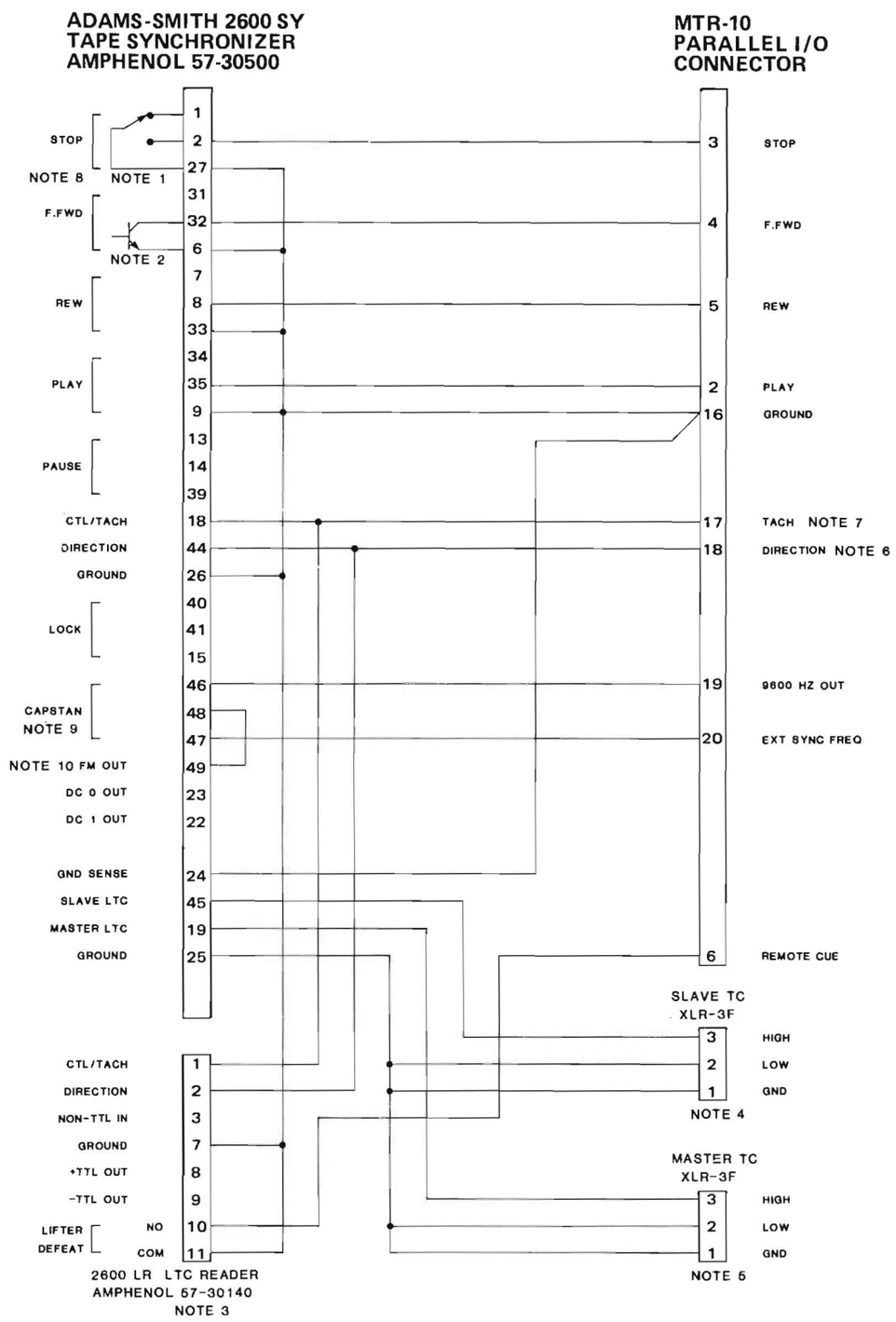


FIGURE 6-6. DETAILS OF INTERFACE CABLE FOR MATING ADAMS-SMITH MODEL 2600 SYNCHRONIZER WITH MTR-10

PARALLEL I/O CONNECTOR ASSIGNMENT

No.	Name	Level	IN OUT	Functions
1	REC SW	Low	←	RECORD SW
2	PLAY SW	Low	←	PLAY SW
3	STOP SW	Low	←	STOP SW
4	F. F. SW	Low	←	FAST FORWARD SW
5	REW SW	Low	←	REWIND SW
6	LIFTER	Low	←	LIFTER DEFEAT COMMAND
7				
8				
9	SHUT OFF	Low	→	SHUT OFF SW
10	REC TALLY	Low	→	RECORD TALLY
11	PLAY TALLY	Low	→	PLAY TALLY
12	STOP TALLY	Low	→	STOP TALLY
13	F. F. TALLY	Low	→	FAST FORWARD TALLY
14	REW TALLY	Low	→	REWIND TALLY
15	Function TALLY	Low	→	FUNCTION TALLY
16	SIG - GND		← →	SIGNAL GROUND
17	TACHO		→	TACHO PULSE (Note 1)
18	REV/FWD	H/L	→	TAPE DIRECTION FWD = Low
19	9.6 KHz (Fix)		→	CAPSTAN CLOCK
20	CAPSTAN CLOCK		←	CAPSTAN SPEED CONTROL CLOCK
21	SPD - A	Low	→	Tape Speed A (Note 2)
22	SPD - B	Low	→	Tape Speed B (Note 2)
23				
24				
25				
26				
27				
28				
29				
30				
31	RESOLVER OUT		→	MTR-10II, 12II only
32				
33	+5V			REGULATED (MIN 150mA)
34	+24V			UNREGULATED (MIN 500mA)
35				
36	POWER GND			
37	POWER GND			

NOTE

1. Output Tacho Pulse Rate

SPEED (ips)	RATE (pulse/sec)
3.75	10
7.5	20
15	40
30	80

2. Tape speed is defined as follows;

SPD - A	SPD - B	Tape Speed
0	0	3.75 ips
0	1	7.5 ips
1	0	15 ips
1	1	30 ips

3. Type of Connector

   D SUB-37 Female (OTARI Parts No.: CN237367)

4. Output Signal

   Output Type : Open Collector

   VOL : 0 - 0.5 V

   IOL : 20 mA (Max.)

   Leak Current : 20 µA (Max)

   Pull Up Resistor : 10 kΩ (Terminated to +5 V)

   VOH (High Level) : 5 V
   Output terminal is connected to +5 V power supply through 10 kΩ resistor

5. Input Signal

   Fan-in : 1.5

   VIL : 0 - 0.5 V (-2.4 mA)

   VIH : 2.5 - 5.25 V (60 µA)

6. Cable Length ; 10 m (32 ft)

6.16 TIME CODE UNIT DESCRIPTION

MTR-10/12 Time Code version has an additional P.C.B. unit at the most left side of the P.C.B. card rack. XLR connectors are mounted on the rear panel next to the convertors for audio signals. Followings are the description on the additional time code unit.
Numbers in brackets, [ ] refer to callouts in Fig. 6-7.

6.16.1 TIME CODE UNIT

The Time Code module is a microprocessor controlled offset unit for recording and reproducing center-channel coincident SMPTE/EBU time code. Despite the fact that the time code head is located between the audio record and reproduce heads (as shown in Figure 6-*), the time code is recorded and reproduced in exact coincidence with the accompanying audio. This exact coincidence of time code and audio in both record and playback is achieved by offsetting the code to compensate for the physical distance between the heads. The amount of offset is automatically determined in response to transport status, tape speed and Input/Sel-Rep/Repro status. The time code channel functions as if it were a third audio channel, with superior cross-talk characteristics, right down to the XL type Input and Output connectors.

[1] READY/SAFE switch

With the switch up, the Time code channel is in record READY mode, and recording will take place if the transport RECORD and PLAY buttons are or have already been pressed. With the switch down, the Time code channel is in SAFE mode, and recording will not take place regardless of the machine RECORD and READY mode.

[2] Monitor mode select switch

This switch is designed to select the time compensation for the time code.

INPUT: The input signal is output as it is without compensation.

SEL·REP: The time code recorded on the tape is reproduced with proper time compensation for the location of the record head.

REPRO: The time code recorded on the tape is reproduced with proper time compensation for the location of the Reproduce head.

This time compensation insures the time code will be in the correct relationship with the audio signal regardless of monitor mode.

[3], [4] INPUT and REPRO LEVEL ADJ trimmers and LED indicator

These controls adjust the level of the input and reproduce signal levels to the time code compensation circuits. The trimmers should be set so that the MONITOR LED [4] turns green. If the level is too low the LED will turn red.

[5] OUTPUT LEVEL ADJ trimmer

Adjusts the level of the time code output.

[6] BIAS LEVEL ADJ trimmer

This control adjusts the bias level of the time code channel.

[7] The DIP switches 4, 5 and 6 on the time code P.C.B. assembly compensate the distance between Time code head and Audio head. Pre-distance compensation is made at the factory and realignment will not be necessary except the case of head exchange refer to Section 4.

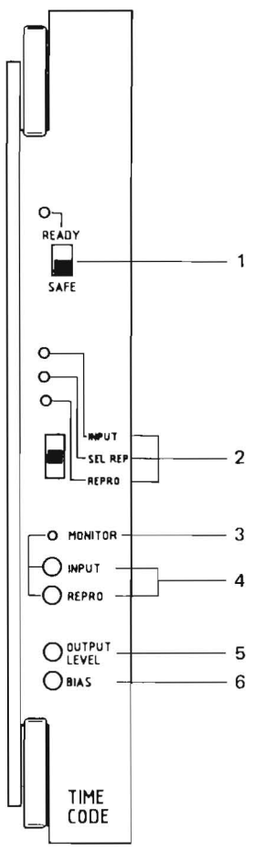


Fig. 6-7 Time Code P.C.B. Ass'y Front Panel

6.16.2 SPECIFICATION FOR TIME CODE VERSION

Channel format: The time code channel conforms to IEC publication 461.

Code format: SMPTE/EBU 80 bit address code.

Track format: 0.38 mm center of tape.

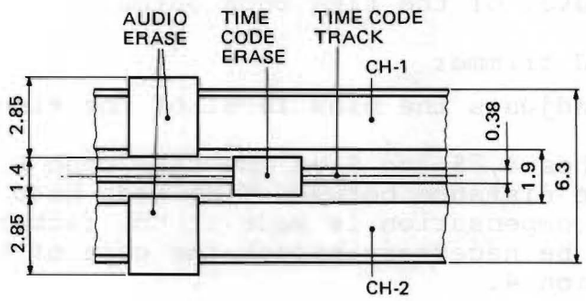


Fig. 6-8

Head mounting

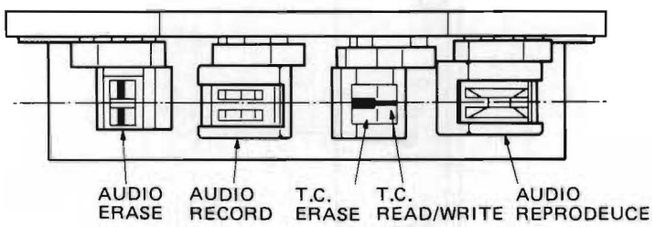


Fig. 6-9

Magnetic flux level: 707 nWb/m p-p ± 3 dB (250 nWb/m rms sinusoidal signal), Normal bias recording, without frequency equalization

Tape speed: 30, 15, 7.5, 3.75 ips

Delay line: Coincidence of audio signal and time code signal in INPUT, SEL·REP, and REPRO modes

Input: Min. 0.2, Nom. 2, Max. 7.3 Vp-p
Active balanced, Input impedance; 20 kΩ (balanced)

Output: Min. 1, Nom. 2, Max. 4 Vp-p
Active balanced, Output impedance; 5 Ω

Readable speed range: From 1/5 to 20 times of normal play speed

Cross-talk (code channel to audio channel);
≧75 dB; 250 nWb/m magnetic flux of audio track

Coincidence error: 0.4 msec between code track and audio track

7

SECTION 7

AUTO LOCATOR

7.1 GENERAL

The OTARI CB-109 Auto Locator is designed specifically for the MTR-10. While the MTR-10 itself has a single search (search zero) function, the Auto Locator has tape time memories that store up to 10 cue points (11 cues when search zero is also considered). Separate digital readouts are provided for Tape Time and Locate Time, and each memory and readout can accommodate times of up to 9 hours, 59 minutes, 59 seconds (i.e., longer than any tape which might be used with the MTR-10). In addition to special Auto Locator functions such as Search, Shuttle and Auto Rewind (described in subsequent paragraphs), there is a duplicate set of tape motion pushbuttons like those on the transport, so a separate Remote Control Box is not required when using the Auto Locator.

All tape motion function buttons have 2-level illumination: dim normally, or bright when selected. The 10 numeric keys (0 through 9) and the adjacent keys are not illuminated; when describing these features, we use the terms "key" and "button" interchangeably.

NOTE: Bracketed numbers in this Section (e.g., TAPE TIME [1]) refer to the callouts in Figure 7-2, unless otherwise stated.

7.2 INSTALLATION

A 32 foot long cable (9.75 meter) is included with the CB-109. Connect this as indicated. (Refer to figure 7-1.).

1. Plug the cable's female multi-pin connector into the mating connector on the bottom, rear recess of the CB-109 Auto Locator. Note that the connectors are keyed so they can only be mated one way. Be sure to press the connectors together until the locking tabs on the side of the cable connector snap into place.

2. Plug the cable's male connector into the mating connector labeled "AUTO LOCATOR" on the rear of the MTR-10. Again, be sure the locking tabs on the connector snap into place.

3. Place the CB-109 in any convenient location. There is a convenient swing-down metal stand on the bottom of the unit; pull it down if you wish the Auto Locator control panel to tilt toward you.

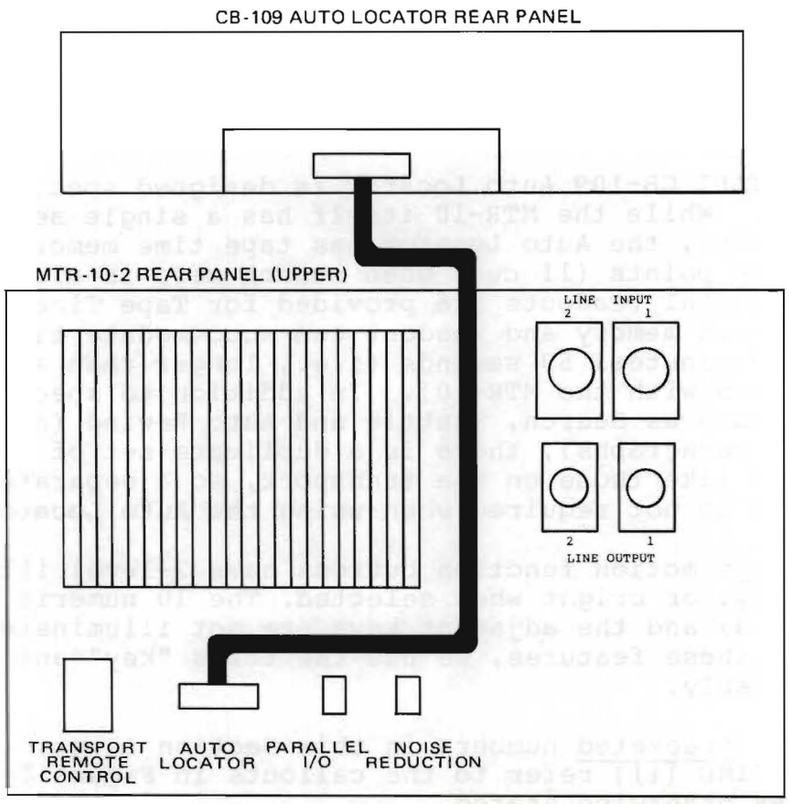


FIGURE 7-1. CB-109 AUTO LOCATOR CONNECTION TO MTR-10

7.3 TAPE TIME

The Tape Time readout [1] displays the elapsed time of the tape. When the MTR-10 is first turned On, both its time display and that of the CB-109 Auto Locator will have the same 0.00.0 readout. If desired, the CB-109 Tape Time readout can be zeroed independently of the MTR-10 (as for the beginning of a particular take). Then cues stored in the CB-109 Tape Time Memory will be referenced to the CB-109's local tape time zero. However, if the CB-109 SEARCH ZERO button [21] is actuated, its Tape Time readout will automatically be synchronized to that of the MTR-10.

1. To zero the Auto Locator Tape Time at the location of the tape currently in front of the MTR-10 heads, press the CB-109 Tape Time RESET button [2]. That display will read 0.00.00.

2. To offset the Auto Locator Tape Time readout from the MTR-10 readout, add (or subtract) the desired offset to the value of the Tape Time readout on the MTR-10. Then enter this value on the CB-109 Locate Time readout [3] by pressing the appropriate numerical keys [8]. (If the Locate Time is incorrectly entered, press the adjacent RESET button [4] and try again). Finally, press the Shift Left button [8].

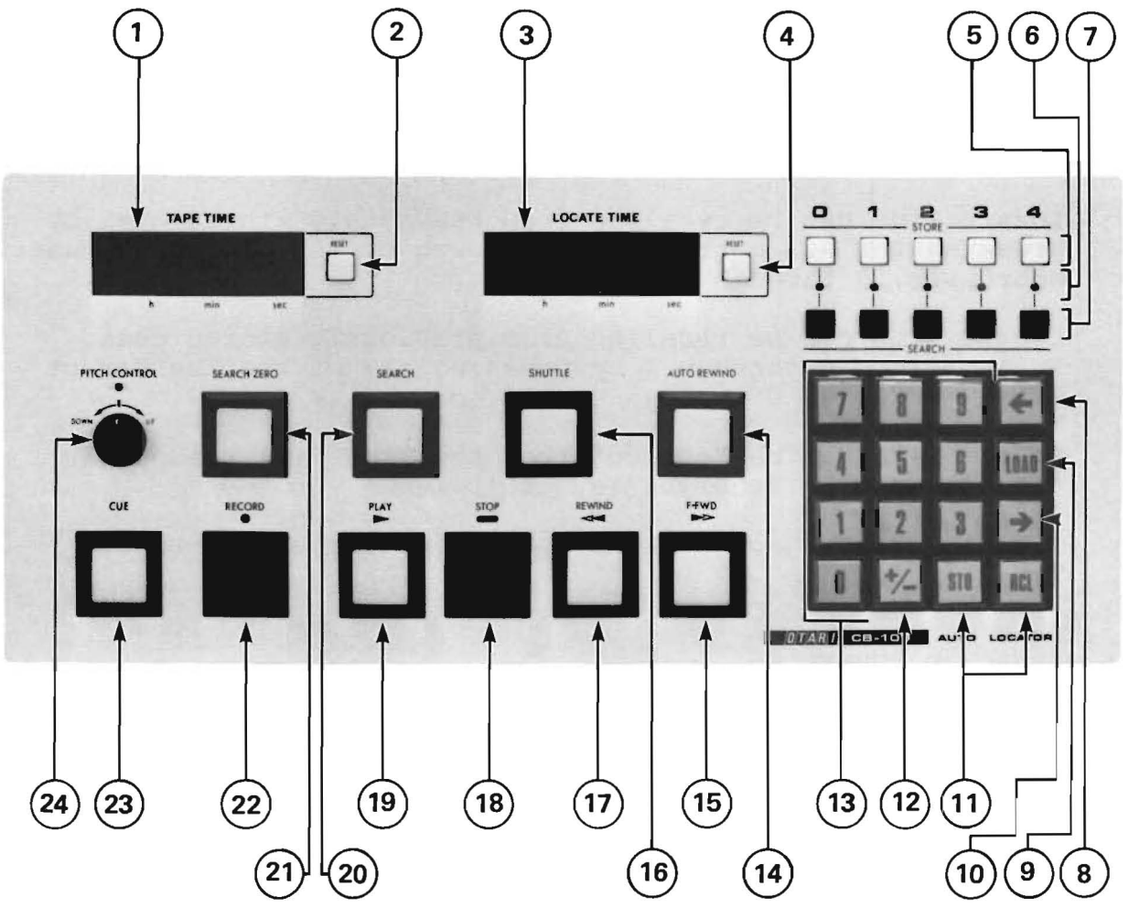


FIGURE 7-2. CB-109 AUTO LOCATOR CONTROLS AND INDICATORS

3. To correlate the CB-109 Tape Time readout with the MTR-10, press the keyboard's LOAD button [9]. (Pressing SEARCH ZERO [21] will accomplish the same thing, but will also cause the tape to move to 0.00.00 unless you subsequently push another tape function button.)

7.4 LOCATE TIME

The Locate Time readout [3] displays the location you wish to reach on the tape when you press the SEARCH [20], Direct SEARCH [7], SHUTTLE [16] or AUTO REWIND [14] buttons.

1. Locate Time can be entered directly from the keyboard numerals [13], or ...

2. Locate Time can be recalled from previously stored cues by pressing the RCL button [11] followed by any of the 10 numeric addresses, 0 through 9 [13], or ...

3. Locate Time can be recalled from previously stored cues in registers 0 through 4 by pressing any of the the direct SEARCH buttons, 0 through 4, [7], or ...

4. Locate Time can be "copied" from the Tape Time readout by pressing the Shift Right key [10].

5. Pressing the adjacent RESET button [4] zeroes the Locate Time display.

7.5 KEYBOARD NUMERALS

The keyboard buttons [13] numbered 0 through 9 have two functions: they can be used to enter a Locate Time or they can address the 10 memory registers. The keyboard is temporarily disabled while the machine is performing a Search, Zero Search, Shuttle or Auto Rewind function.

NOTE: It is impossble to enter a Locate Time with a numeral of 6 or higher in the second digit from the right of the readout, since this would indicate 60 or more seconds, and should instead be entered in minutes. Similarly, a 6 or higher cannot be entered in the fourth digit from the right, as this number of minutes really belongs in the hours column.

7.6 SHIFT LEFT AND SHIFT RIGHT

The SHIFT LEFT button [8] copies whatever time is shown in the Locate Time readout and also displays it in the Tape Time readout. Conversely, the SHIFT RIGHT button [10] copies the Tape Time to also become the Locate Time.

7.7 LOAD

The LOAD button [9] changes the Tape Time readout to display the same tape time shown on the MTR-10 readout. In other words, it resets the Auto Locator Tape Time to correspond to the actual time shown on the transport.

7.8 CONVENTIONAL STORE/RECALL/SEARCH VS. DIRECT STORE/SEARCH

There are two ways to store and recall tape times for cue searching. The "conventional" method requires several key strokes to be used to enter a Locate Time and then store it, and more strokes to recall it from a paritcular memory address and then search for it. The "direct" method, introduced with the CB-109 and MTR-10 system, provides an additional 5 Direct STORE buttons and 5 Direct SEARCH buttons. Pressing one direct STORE button "captures" the current Tape Time (whether tape is stopped or moving) and stores it in a memory address. Pressing the corresponding direct SEARCH button then recalls that time and initiates a search to that tape location. All memory is volatile, meaning it is not saved after the power is turned Off.

7.8.1 CONVENTIONAL MEMORY STORE

The STO button [11] is used to memorize the time displayed in the Locate Time readout. Up to ten different times can be memorized at once.

1. To store a given cue, display the time in the Locate Time readout, either by direct entry with the numeric keys [13] or by using the SHIFT RIGHT button [10] to move the Tape Time to the Locate Time readout.

2. Press the STO button [11], and then press any one of the 10 numeric keys [13]. The number pressed, 0 through 9, becomes the "address" where the Locate Time is stored.

   NOTE: When you store a Locate Time in addresses 0 through 4, the amber LED [6] beneath the correspondingly numbered Direct STORE button will light up to show that that memory register is now occupied with a time other than 0.00.0. There are no "memory occupied" lights for addresses 5 through 9.

3. To store a second cue, repeat Steps 1 and 2 using a different numeric address. If the same address is re-used, the previously stored time will be replaced by the new entry.

   NOTE: There is a way to "catch a cue on the fly" without using Direct STORE (while the technique does require more

button pushing, you are not limited to the first 5 memory registers). While tape is playing or recording, press SHIFT RIGHT at the exact instant you want to memorize the Tape Time. Then, whenever it is convenient, press STO followed by a numeric address 0 through 9.

7.8.2 DIRECT MEMORY STORE

One of the five Direct STORE buttons [5] is used to memorize the tape location displayed in the Tape Time readout [1]. This may be done while tape is stopped, or in play, record, rewind or fast forward mode. The five memories available (addresses 0 through 4) are the first five of the ten memories that were described in conventional storage (Section 7.8.1).

1. To store a Tape Time, press one of the Direct STORE buttons. The amber LED beneath the button [6] will light up to show that that memory register is now occupied with a time other than 0.00.0.

2. The Direct STORE button will have no effect if the particular memory associated with the button (#0 through #4) is already occupied, as indicated by the illuminated amber LED below the button.

   NOTE: While you can use the conventional store technique to write over an old tape time with a new one, you cannot do this with Direct STORE. Direct STORE does not work unless the memory first has been zeroed.)

7.8.3 CLEARING (ZEROING) A MEMORY

All memory addresses are zeroed when the MTR-10 is first turned On. Once times have been stored, there are several ways to zero the memories.

1. You can press the Locate Time RESET button [4] to zero the Locate Time display. Then store that zero time in the desired address by pressing STO and key 0 through 9.

   NOTE: If you are zeroing register 0 through 4, the amber LED [6] below the correspondingly numbered Direct STORE button will turn Off, confirming the registers is blank.

2. For addresses 0 through 4, you can press the corresponding Direct STORE button [5] twice quickly (within about 500 mS), and the amber LED below it turns Off.

7.8.4 CONVENTIONAL MEMORY RECALL AND SEARCH

The RCL button [11] is used to retrieve a time which was previously stored, and display in the Locate Time readout. The MTR 10 can then be made to search to that Tape Time by pressing using the SEARCH function.

1. To recall a given cue, press the RCL button [11], and then press the numeric key (0 through 9) which identifies the address where that time was stored. The stored time will be displayed in the Locate Time readout, and will also remain in memory.

   NOTE: To recall another cue, repeat Step 1; it is not necessary to first reset the Locate Time readout since the recalled time will replace any previously displayed Locate Time.

2. To search to that cue, press the SEARCH button [20]. The MTR 10 will fast wind (forward or rewind) to that point on the tape and stop.

3. If you wish the MTR 10 to enter play mode upon reaching the cue point, press the PLAY button on the transport or the Auto Locator after pressing the SEARCH button. The PLAY button lamp will flash until the cue point is reached, confirming that the unit will enter play mode at the cue.

7.8.5 DIRECT MEMORY SEARCH

The Direct SEARCH buttons [7] provide a single-button method of recalling a cue and searching to it.

1. Decide which memory address you wish to recall and search for, 0 through 4, and press the corresponding Direct SEARCH button.

2. The stored time will be displayed in the Locate Time display [3], and the MTR 10 will search to that point on the tape and stop. The stored time continues to remain in memory.

   NOTE: You cannot press another direct SEARCH button to recall and search to another cue unless either (1) the first cue point has already been reached, or (2) you press the STOP, REWIND or F.FWD button before pressing another direct SEARCH button. (Pressing Play will merely result in the MTR 10 continuing to search for the first cue, then entering play mode when it gets there.)

7.9 SEARCH ZERO

Pressing SEARCH ZERO button [21] causes the MTR-10 to return

at fast winding (or rewinding) speed to the 0.00.00 actual Tape Time shown on the transport readout. There are two variations of Zero Search mode.

NOTE: If the Auto Locator Tape Time readout has been changed to a zero different from the MTR-10, it will automatically be reset to match the MTR-10 the moment ZERO SEARCH is pressed. Zero Search always looks for the zero of the MTR 10 display.

1. Pressing SEARCH ZERO [21] will rewind tape to zero Tape Time and then stop the transport.

2. Pressing SEARCH ZERO and then PLAY [19] causes the PLAY button to flash bright and dim; tape rewinds to the zero Tape Time and then enters Play mode.

   NOTE: While the MTR-10 can be made to Search zero and then play, it cannot be made to search zero and automatically enter record. We suggest pressing SEARCH ZERO. Then, after tape parks at 0.00.00, press PLAY and RECROD.

3. To end ("abort") a zero search, the press STOP, REWIND, or FAST FORWARD buttons on the Auto Locator, or on the MTR-10.

7.10 SHUTTLE

Pressing the SHUTTLE button [16] causes the MTR-10 to "remember" the current Tape Time displayed on the readout [1], and to enter (or continue in) Play mode until the displayed Locate Time [3] is reached. Then the tape automatically rewinds to the point where SHUTTLE was first pressed, and again plays to the Locate Time. This cycle continues until you exit Shuttle mode, as explained below. Shuttle is helpful for replaying a section of an alignment tape, for rehearsing particular segments of a tune, and so forth.

NOTE: The above description assumes the Locate Time is greater than the displayed Tape Time. If not, the SHUTTLE button will not have any effect (you can't make the machine shuttle ahead to a Locate Time that is actually behind the current Tape Time.)

1. Enter the Locate Time at which you want the shuttle to stop and rewind the tape (either directly from the keyboard, or by using the RCL button and a memory address.

2. Move the tape to the point where you want the shuttle operation to begin.

3. The transport can be in Stop, Play or Record mode at this point; Press SHUTTLE [16].

4. If you wish to enter Record mode at any time while tape is

playing in Shuttle mode, press the RECORD button on the Auto Locator or the MTR-10. The machine will continue recording for the duration of this "pass", but will return to Play mode after it rewinds to the beginning of the shuttle segment.

NOTE: You cannot "preset" the machine to begin recording by pressing RECORD while the tape is rewinding in shuttle mode.

5. To end ("abort") a Shuttle, press STOP, REWIND, or FAST FORWARD or PLAY on the Auto Locator or the MTR-10.

7.11 AUTO REWIND

AUTO REWIND [14] is similar to Shuttle, except the tape will play to the Locate Time, rewind, and stop at the point you first pressed AUTO REWIND rather than continue the play/rewind cycle.

7.12 TRANSPORT CONTROLS

The Auto Locator's RECORD, PLAY, STOP, REWIND, FAST FORWARD and CUE buttons duplicate the functions of their counterparts on the MTR-10 and serve as a remote transport controller. The only difference is that the CUE button on the CB-109 Auto Locator [23] is only useful for retracting the tape lifters during fast winding; it does not enable the CUE lever on the MTR-10.

The PITCH CONTROL on the Auto Locator [24] works just like the one on the MTR-10. You will recall that the MTR-10 PITCH CONTROL is active when the SPEED MODE switch is in VARI position. The MTR-10's SPEED MODE switch must be in EXT position to activate the CB-109 Auto Locator PITCH CONTROL (as indicated by the illuminated amber LED above that control). This enables you to independently set two different non-standard (PITCH CONTROLLed) speeds, one with the MTR-10 and one with the CB-109, and to then select between them by moving the MTR 10 SPEED MODE switch between EXT and VARI positions.

7.13 EXAMPLES OF AUTO LOCATOR OPERATION

The following examples are intended to help familiarize you with Auto Locator functions; they are by no means comprehensive. As you use the Auto Locator for actual recording and editing functions, you will undoubtedly devise useful techniques to accomplish your unique goals. Initially, it is assumed that power is on, a reel of tape is threaded, and the transport in Stop mode.

1. MANUALLY ZERO THE TAPE MACHINE AND AUTO LOCATOR AT THE END OF THE LEADER TAPE.

When power is first turned on, the displays of both the MTR-10 and the CB-109 are zeroed. However, this is generally not the zero point you want to use because on a Zero Search function, the tape may unthread itself, and because there is no absolute reference point for logging cues. Therefore, do the following.

A. Play or fast wind the tape ahead to the end of the leader, or approximately 10 to 20 seconds if there none or if the leader is short.

B. Press the RESET button adjacent to the Tape Time readout on the MTR-10. That readout will now display 0.00.00. (0 hours, 00 minutes, 00 seconds).

C. Press the LOAD button [9] on the Auto Locator so its Tape Time readout also displays 0.00.00.

2. ENTER A LOCATE TIME AND SEARCH AHEAD TO IT.

A. With the tape stopped at zero Tape Time, use the keyboard [13] to enter a Locate Time of 1 minute, 35 seconds (press 1 then 3 then 5).

B. Press the SEARCH button [20]. It and the FAST FORWARD button will light up brightly, and tape will wind ahead fast, begin slowing at about 1 minute on the Tape Time readout, and stop when the Tape Time displays 0.01.35. The STOP button will then light up and the others will return to their dim state.

3. CONVENTIONALLY STORE A CUE FOR FUTURE RECALL

A. To memorize the locate time of 0.01.35, now displayed on the Locate Time readout, press the STO button [11] and the "7" key on the keyboard.

B. The cue is now stored in memory address "7".

C. If you want to check that the cue is stored, first clear the Locate Time by pressing its RESET button [4]; the readout should change to 0.00.00.

D. Now press RCL [11] and number "7"; the Locate Time Readout should again display 0.01.35.

4. SEARCH AHEAD AND ENTER PLAY MODE WHEN THE CUE IS REACHED

A. Clear the Locate Time by pressing the RESET button.

B. Use the keyboard to enter a locate time of 6 minutes, 13 seconds (press 6 then 1 then 3).

NOTE: As you enter the number, "61" will momentarily appear in the seconds column until the 3 is entered. If you try to enter 61 seconds (or 61 minutes) and either search to or store that value, the Locate Time display will flash, indicating an "illegal" instruction. The MTR-10 will not accept a minutes or seconds number larger than 59. To clear the error, press the Locate Time RESET button [4].

C. Press the SEARCH button, and tape will begin fast winding.

D. While tape is winding, press the PLAY button on the Auto Locator. It will begin flashing.

E. As the Tape Time approaches and then reaches 0.06.13,
   1. The REWIND and F.FWD buttons alternately flash bright, indicating the transport is toggling to to slow down and stop,
   2. At 0.06.13, the STOP button brightens and the tape momentarily stops,
   3. The PLAY button stops flashing and stays brighter,
   4. The transport enters Play mode,
   5. The SEARCH button returns to its dim state.

F. If you want to save the 0.06.13 cue point (do so for now), press the STO button and number "6" on the keyboard.

5. SEARCH BACK TO THE FIRST CUE AND THEN STOP

A. Press the RCL button followed by number "7" to recall the first cue saved; the locate time should now read 0.01.35.

B. Press SEARCH and tape will begin rewinding to the cue; the SEARCH and REWIND buttons will be brightly illuminated.

C. When the Tape Time comes within about 30 seconds of the desired Locate Time, the REWIND and F.FWD lights alternately flash bright, indicating the transport is toggling to slow down and stop.

D. When the Tape Time reaches 0.01.35, the STOP button brightens, and tape motion stops. All other buttons return to their dim state.

6. SEARCH TO ZERO

A. With the tape stopped at the 0.01.35 cue, or playing, press the SEARCH ZERO button; tape will begin rewinding

and the SEARCH ZERO and REWIND buttons will be brightly illuminated.

B. When the Tape Time reaches 0.00.00, the transport will stop, the STOP button will light up and the others will dim.

7. AUTO REWIND

A. Recall the 1 minute 35 second cue by pressing RCL and number "7".

B. Press the PLAY button.

C. When the Tape Time reaches about 20 seconds, press the AUTO REWIND button [14], which will brighten.

D. Tape will continue playing until it reaches the 0.01.35 cue; it will then rewind to the same Tape Time as when you pressed AUTO REWIND (i.e., about 20 seconds) and stop. The STOP button will light up, and the others will dim.

8. SHUTTLE

A. Clear the Locate Time by pressing RESET, and enter a new time that is about 20 seconds ahead of the current Tape Time (i.e., if you are at 20 seconds, enter 40 seconds).

B. Press the SHUTTLE button [16]; tape will begin to play and the SHUTTLE and PLAY buttons will brighten.

C. When the Locate Time is reached, the PLAY button will dim, REWIND will brighten, and tape will rewind to the same Tape Time as when you pressed SHUTTLE.

D. The PLAY button will then brighten (SHUTTLE is still bright), and tape will play ahead to the Locate Time. This cycle will continue indefinitely until you press STOP, PLAY, REWIND, or FAST FORWARD.

9. DIRECT STORE/SEARCH

A. Place the transport in Play mode, and zero the Locate Time display by pressing RESET [4].

B. While tape is playing, press the STORE #2 button [5] and observe the Tape Time display [1] as you do so. Notice that the amber LED below the STORE button turns On to indicate that memory is now occupied.

C. Press F.FWD, and fast wind ahead a minutue or two in Tape Time.

NOTE: When you pressed Direct STORE #2, you stored that instantaneous Tape Time in memory address register number 2. To check this, press RCL [11] and then key #2. Notice that the Locate Time display now shows the time that was in Tape Time at the instant you pressed Direct STORE. You could now search to this location by pressing the SEARCH button [20], but the procedure in Step D would be even faster, so press Locate Time RESET [4] to zero Locate Time to make that demonstration clearer.

D. To search to the Direct Stored location with a single stroke, simply press the Direct SEARCH #2 button [7]. The Locate Time readout [3] will now display the same time that was present when you first pressed Direct STORE, and the transport will search to that time and stop.

NOTE: If you press PLAY while the search is ongoing, the unit will enter play mode upon reaching the cue.

NOTE: If you press the Direct SEARCH button of an "unoccupied" register (amber LED Off), the transport will search to 0.00.00 (just like SEARCH ZERO).

11. CLEARING A DIRECT STORE MEMORY

A. Whether memory address #0 through #4 had a time cue stored by pressing its Direct STORE button, or by using the STO button and a numerical key, the amber LED below the Direct STORE button will be On.

B. Press that Direct STORE button twice quickly so the LED turns Off. That address will now be occupied by 0.00.00, or ...

C. Press the Locate Time RESET button [4], and then press STO and the appropriate numerical key to store 0.00.00 in that memory.

12. "ILLEGAL" COMMANDS

A. Stop the tape. Enter a Locate Time that is earlier than the displayed Tape Time, and press the SHUTTLE button. Observe that the button does not illuminate, and nothing else happens; the machine cannot shuttle (play) ahead to a location that is not ahead on the tape.

B. Without changing anything from Step A above, press the AUTO REWIND button. For the same reasons, that button does nothing. The command is ignored.

C. Enter a Locate Time that is a few minutes ahead of the currently displayed Tape Time. Press SEARCH. While tape is winding ahead, try to enter a new Locate Time, or try to use RCL to recall a previously stored time. Press RESET on the Tape Time or Locate Time. Notice that these functions are temporarily disabled (do not have any effect) until the search is completed and the machine returns to Stop mode. The same is true during a Direct SEARCH.

8

SECTION 8

FIELD CONVERSIONS

There are many variations available for the MTR-10. Several conversion kits are also available so that you can convert your model to another type. Various kits are covered in this section of the manual. New kits, however, may become available after the printing of this manual. Please contact your dealer or Otari representative for the latest information.

Please refer to the operation and maintenance manual included in each conversion kit for further explanation as to its function, modification, installation, and its parts.

The following are the types of conversion kits available from Otari:

8.1 OVERBRIDGE CONVERSION KIT

This kit is used for converting a standard console model to an overbridge type. Two types, one for the MTR-10 and the other for the MTR-12 are available. Kit numbers are as follows:

MTR-10	Parts numbers are not decided yet. Ask for your dealer or OTARI representative.
MTR-12	

8.2 STANDARD CONSOLE CONVERSION KIT

This kit is used for converting an overbridge type to a standard console model. The MTR-12 overbridge type can now also be converted to a standard type.

8.3 FULL TRACK CONVERSION HEAD ASSEMBLY

This is a head assembly kit used for modifying MTR-10-2 into a full track model. For this modification, an audio P.C.B. assembly must also be modified. Due to the ease of modification, we recommend that you modify the assembly according to the explanation attached. (See page 13-22.)

FULL TRACK CONVERSION HEAD ASSEMBLY KH-41LA

8.4 DIN TRACK CONVERSION HEAD ASSEMBLY

Among the MTR-10 1/4" 2T models, there is a model for which a DIN HEAD is employed. This is a head assembly kit used for modifying the MTR-10 1/4" 2T based on NAB specifications into a model based on DIN specifications. For this modification, an audio P.C.B. assembly must also be modified. Due to the ease of modifi-

cation, we recommend that you modify the assembly according to the explanation attached. (See page 13-22.)

DIN TRACK CONVERSION HEAD ASSEMBLY KH-41KA

8.5 PARTS KIT FOR MODIFICATION OF 1/2" MODEL INTO 1/4" MODEL

This kit is used for modifying the 1/2" model into the 1/4" model. Several types have already been put on sale for the MTR-10 model. (The letter which follows the serial number denotes the type.) Please contact your Otari dealer or Otari representative for the latest information prior to ordering any kits for modification.

ZA-52U ..... For MTR-10 1/2" "A ∿ J" type

ZA-53K ..... For MTR-10 1/2" type from K and all types of MTR-12

An Audio P.C.B. assembly must also be modified. Refer to page 13-22 to find out the differences.

8.6 MODIFICATION FOR LOW SPEED OPERATION (3.75, 7.5, 15 ips)

The MTR-10 can be field modified for operation at 3.75, 7.5, and 15 ips instead of the standard 7.5, 15, 30 ips operation. Otari suggests that the end user purchase pre-wired AUDIO boards since the modifications to the AUDIO boards are extensive. The AUDIO BOARDS are available pre-wired as PB-14XB (low speed two or four track), and PB-14XBA (low speed full track/mono).

On all machines perform the following modifications:

1. CAPSTAN CONTROL BOARD (PB-44W)

   A) Move all three jumpers (J1) from H to L position. (One position closer to the board edge connector).

      NOTE: J1 jumpers may resemble resistors.

2. REEL CONTROL BOARD (PB-44V)
   (Boards with suffix "A" and later only).

   - Install J1, located between ICs 7, 15, & 23 and R 183 & R 109.

3. AUDIO CONTROL BOARD (PB-44X)

A) Move all three jumpers (J2, J3, & J4) from H to L position located near capacitors C28, C29, & C30. (One position closer to the top edge of the board).

4. AUDIO BOARDS (PB-14X)
(Refer to the paragraph 8.6 on this page regarding pre-wired audio boards.)

A) Move two jumpers in the record section from H to L position located near the center of the PCB near R184 & R185.

B) Move two jumpers in the repro section from H to L position, located just to the rear (toward edge connector) of the REPRO EQ trimmers.

C) Change resistors and capacitors in accordance with Table 8-1. For resistors use 1/4 Watt, 5 % carbon or metal film; for capacitors use polystyrene upright mounting type.

D) After completing all component and jumper changes, perform the Repro (and Sel-Rep) and Record alignment procedures beginning in Section 4.5 in this manual.

TABLE 8-1 COMPONENT CHANGES ON AUDIO BOARD FOR LOW SPEED OPERATION

CHANGE	FROM	TO	
R160	33K	15K	*
R165	OPEN	6.8K	*
R167	15K	10K	
R168	6.8K	11K	
R169	47K	43K	
R172	6.8K	2.7K	*
R179	2.7K	1.5K	
C75	100 pf	120 pf	*
C76	OPEN	680 pf	*
C77	0.0068 mfd	0.01 mfd	*
C78	120 pf	180 pf	*
C79	680 pf	0.0015 mfd	*
C80	0.01 mfd	0.022 mfd	
C81	180 pf	470 pf	
C82	0.0015 mfd	0.0022 mfd	
R35	2.2 m	OPEN	
R36	390K	910K	
R37	1.5 m	2.2 m	*
R39	SHORT	2.0K	
R40	1.6K	2.4K	
R41	2.7K	3.3K	*
R42	3.0K	4.3K	
R43	3.3K	SHORT	*
R44	4.7K	7.5K	
VR3	2K	5K	*
VR5	5K	10K	

(NOTE: Components marked with an asterisk (*) in Table 8-1 can be removed from their previous positions on the board and reused.)

FIGURE 8-1 MTR-10-2 WITH OVERBRIDGE INSTALLED

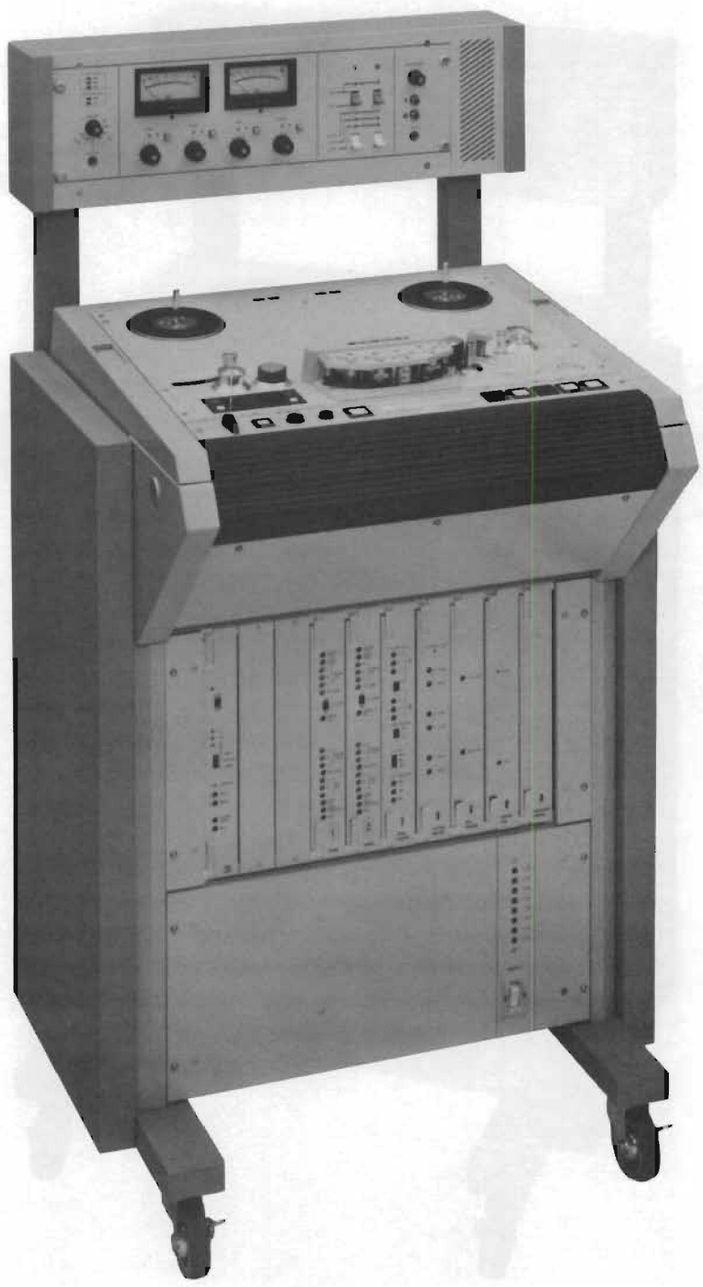


FIGURE 8-2 MTR-12-2 WITH OVERBRIDGE INSTALLED

8.7 PARTS KIT FOR CENTER TRACK CONVERSION

ZA-55H is the parts kit for converting standard MTR-10 and MTR-12 record and reproduce tape deck to center track time code version. This kit has complete installation manual in it. Refer to it. We also provide several standard center track versions. So refer to page 1-1 and contact your nearest OTARI dealer or OTARI representative.

9

SECTION 9

CIRCUIT DESCRIPTION

NOTE: These discussions sometimes refer to various versions of the MTR-10, such as "A", "B" etc. Your machine's version can be determined by looking at the letter which follows the serial number, as stamped on the label on the rear of the machine or on the brace below the transport deck plate.

9.1 RECORD/REPRODUCE ELECTRONICS -- GENERAL

All the record/reproduce electronics for one channel are located on one circuit board, with the exception of the headphone monitor amplifier and the mode switching, which are located on the main audio control panel. Active, differential inputs and outputs are provided, with a cross-coupled feedback network on the output which allows either of the "hot" sides to be tied to ground without instability; the remaining "floating" side of the output is automatically boosted 6 dB in level to compensate for the unbalanced situation. A "BAL-UNBAL" switch is provided on the circuit board (on "B" and later versions) for optimum operation in permanent installations which are to be unbalanced.

Otari has a standard reference level (SRL) switching system which allows you to instantly change input and reproduce reference levels simultaneously for three standard flux levels (185, 250 and 320 (IEC) nWb/m^2). In addition, there is switchable NAB or IEC equalization for low and mid speeds, with AES equalization for high speed (30 ips) in the standard model; AES EQ is unnecessary in the low speed version. Low frequency playback compensation, which can be switched In or Out, permits the low frequency response to be "flattened," a particularly useful feature for tapes recorded on other types of tape machines. Adjustable record phase compensation is provided for each of the 3 speeds; this provides greater transient accuracy and allows complex waveforms to be recorded at higher levels without distortion. The built-in test oscillator has square wave capability for setup of the phase compensation.

9.2 REPRO HEAD AND ELECTRONICS

The head employs a "butterfly" pole piece design to reduce contour effect. The head is made of sendust* alloy for long wear, and is directly coupled to the repro head preamplifier (IC1), a special 7-pin in-line low-noise op amp (Hitachi P/N HA-12017). The first stage repro preamp, which takes its signal from the repro head, is unequalized (flat response). The Sel-Rep preamp takes its signal from the record head during "sync" operation. Unlike the repro preamp, the Sel-Rep preamp is designed for a low source impedance head and contains bias trapping and some high frequency

*Sendust is a registered trademark of JVC corporation.

gap loss equalization. The Sel-Rep preamp employs a matched dual FET (Q1) and a matched dual transistor (Q2). The Sel-Rep preamp output level is adjusted via VR2 (front panel SEL-REP GAIN). The repro output level is adjusted after the first stage preamp by VR1 (front panel REPRO GAIN). Series/shunt FETs Q4 through Q7 select either the output of the repro stage, or the output of the Sel-Rep stage. The signal then goes to IC2, the heart of the repro/Sel-Rep IEC/NAB/AES equalizer. The required time constants for these EQ characteristics are switched into the op amps's feedback loop via FETs Q8 through Q15. Jumpers J1 and J2 are factory installed in the "H" position for "high speed" and set the EQ for 7.5/15/30 ips operation. A low speed 3.75/7.5/15 ips version is available, in which case the two jumpers are installed in the "L" position for "low speed." (There are a number of other changes required on the transport logic boards, so field modification for different speeds is not recommended). Following the EQ comes the low frequency compensation, which is handled by IC2. Then follows an AGC stage (automatic gain control) consisting of IC3 and FETs Q18 and Q19, which are summed into buffer stage IC4. The AGC is enabled in CUE mode, and serves to prevent possible damage to monitor speakers from the low frequency audio components present when tape is shuttled past the heads at reduced speed in repro or sel-rep mode (on the average, signal level is reduced about 20 dB).

9.3 AUDIO OUTPUT STAGE

The signal source which feeds the LINE OUTPUT is selected via logic actuated FETs Q20 through Q24, connected in a series/shunt arrangement. The selection of playback signal from the repro or Sel-Rep circuitry is made at an earlier stage, as previously described. At this point, the FETs select either the input or the tape output (Sel-Rep or repro). The audio signal is then buffered by IC4, whose output simultaneously feeds the PEAK LED circuit and the driver for the differential output stage. The PEAK LED circuit consists of op amps IC5 and IC6, and one-shot IC9. The PEAK LED turn-on point is adjusted via VR9, which is in the feedback loop of IC6 and has an approximate adjustment range of +6 dB to +20 dB (ref. 0 VU) for LED turn-on. The audio signal is also routed to the output balanced predriver IC7. Just ahead of IC7, shunt resitors R76, and R77 and transistors Q25, Q26 and Q27 serve as a 3-way attenuation pad for the three different SRL presets. Trimmer VR8 adjusts the gain of IC7, and thus the gain of the entire output stage.

IC8 and tab-mounted transistors Q29 through Q32 comprise the differential output stage. Cross-coupled feedback is supplied via capacitors C48 through C51 and resistors R110 through R115. Positive grounding of the low side of the output is provided by switch SW2 (for unbalanced operation where the signal ground is uncertain). The unit is factory shipped with SW2 in "BAL" position (ungrounded).

9.4 RECORD ELECTRONICS

The LINE INPUT comes into a balanced differential amplifier, IC10. An FET switch (Q36 and Q37) then selects signal either from that differential amplifier or from the built-in test oscillator or front panel EXT. OSC. jack. Trimmer VR11 (front panel INPUT SENSITIVITY control), which is in the feedback loop of IC10-B, adjusts the overall record input sensitivity. FETs Q38 through Q41, which are in the input and the feedback loop of IC11, select the SRL presets. The INPUT level control on the main audio control panel allows for real-time level adjustment when the SRL button is disengaged. IC11-B is the record equalizer stage. As with repro EQ, there are 5 basic record EQ characteristics: IEC or NAB at 7.5 ips, IEC or NAB at 15 ips, and AES at 30 ips. The time constants for the three speeds are switched by FETs Q42 through Q45. Jumpers J3 and J4 are factory installed in the "H" position for "high speed" and set the EQ for 7.5/15/30 ips operation. A low speed version is available for 3.75/7.5/15 ips operation, in which case the jumpers are installed in the "L" position for "low speed." (As stated earlier, other transport logic changes are required so field modification is not recommended). In series with the jumpers is the switching for IEC and NAB equalization, Q46 and Q47. IC12-B is an all pass filter which is used for record phase compensation. The appropriate time constant for the different speeds is selected with Q52 through Q54 and front panel PHASE COMP trimmers VR17 through VR19. The phase compensation counteracts the phase errors introduced by the record equalization. The all pass filter stage also acts as the driver to the record head, through a bias trap consisting of coil L5 and capacitor C90, as well as section A of record relay RL1.

9.5 BIAS/ERASE CIRCUITRY AND TIMING

Bias and erase signals are derived from clock pulses that enter the record/repro AUDIO board as a 500 kHz logic-level pulse train. Data latch IC16, in combination with AND-gate IC15, divides this signal down to biphase 250 kHz. For bias, the 250 kHz signal is amplified and converted to a sine wave via transistors Q62 and Q63, and slug-tuned transformer T1. For erase current the same biphase 250 kHz signal is converted to sine wave via transistors Q64 and Q65, and slug-tuned transformer T2. Bias, erase and record functions are turned On at slightly different times to ensure the noise-free onset of recording. This timing is determined by shift register IC20, which is clocked at a 50 Hz rate by the time base provided from the MASTER CPU board. A soft ramping of bias and erase current is accomplished via a voltage controlled current source (VCCS) consisting of transistors Q55 through Q60 and associated components. Bias level is determined by the voltage which is applied to this VCCS at the input of IC14. VR20 (front panel BIAS trimmer) adjusts the bias on each AUDIO card. The MASTER BIAS adjustment consists of a DC reference voltage supplied to VR20 from the AUDIO CONTROL board.

9.6 MASTER CPU: BOARD "B"

All MTR-10 transport functions are controlled by a central processing unit (CPU) based on a standard 8085A microprocessor. In addition to the 8085A, the MASTER CPU board also contains one 64K PROM ICs (type 2764 Programmable Read-Only Memories) on which reside the machine control program. There are also two type 2114 4K RAM (Random Access Memory) ICs and several timer and bus driver peripheral devices. There is also an ASCII (American Standard Code for Information Interchange) keyboard encoder, IC3 (type 8279), which is used for an interface between the recorder and the optional auto locator. A significant part of the CPU program is to maintain constant tape tension at all times via an algorithm that compares the rate of rotation of the two reel motors with the rate of rotation of the real time tach idler; the program computes the amount of tape on both the supply and takeup reels and therefore "knows" how much tension to feed to each motor. This information is derived from A-to-D (Analog-to-Digital) converters on the REEL CONTROL board, avoiding the need for any mechanical swing-arm type sensors.

To determine the status of the servo PC boards, the CPU is programmed to look at each card via sequential polling of its input ports. Each servo board has one or more tri-state buffers connected to the 8-bit data bus that is common to the servo cards as well as the CPU board. If a transport control button is depressed, the CPU will detect this status when the tri-state buffer which is connected to the buttons is polled. The CPU then will output the appropriate commands to the tri-state buffers that are connected to the capstan motor, the reel motor MDAs (motor drive amplifiers) and the transport indicator lamps, thus placing the transport in the desired mode of operation.

The CPU board contains a bi-color LED (red and green) which displays the status of the CPU. If the CPU is operating normally, the LED will be green. If an error on the data bus is detected, the LED will turn ON both red and green (and therefore appears to be amber), remaining this way until the power is turned Off and the CPU resets itself. This occurs even if an error has occurred only once but is not currently present. If a short circuit or some semi-permanent error is detected, the LED will latch red.

In addition to polling, some of the transport functions are managed via an interrupt structure, including the constant tension system, and dynamic adaptation to external synchronizer commands. The interrupts are brought to the data bus via IC39 through IC42; IC39 latches the decoded data onto the 8-line data bus.

Timer IC23 functions as a divider for the 2 MHz system clock crystal, providing the required clock frequencies for the capstan motor, the reel clock, and the tape sync clock.

9.7 TRANSPORT CONTROL: BOARD "A"

This board serves as an interface between the 8-bit data bus (which is common to several boards), the transport control pushbuttons, the up/down counter chip, and the Auto Locator tally lamps, the transport tally lamps, and the solenoids for the pinch roller and brakes. IC1 (an LS244) is a tri-state buffer between the pushbutton contact closures on the transport and the 8-bit data bus. When input port 63 is enabled by the CPU during polling, this tri-state buffer is enabled and the status of the pushbuttons is read into the data bus (the 8 data bus lines are labeled D0 through D7. IC13 (an LS259) is a BCD to decimal decoder, and drives the takeup and supply brake solenoids as well as the 2-position capstan pinch roller drivers; this function is enabled by output port 65. 6 LEDs on the circuit board (D10 through D15) turn On to show the status of the IC13 outputs. IC21 (also an LS259) drives both the transport pushbutton tally lights and, through buffer IC20, the Auto Locator tally lamps. IC26 (also an LS259) decodes the record, mute, AGC and the memory 0 through memory 4 lamps on the autolocator when the CPU output 66 is enabled. The Otari I-0012 proprietary microprocessor IC10 is used here as a real time bi-directional counter; it loads hours, minutes, seconds and 1/10 second information into the data bus when CPU inputs 65 and 66 are enabled. This up/down counter function is duplicated by the same I-0012 chip located beneath the transport, next to the real-time readout. The purpose of this redundancy is to avoid the undesirable side-effects of long multiplexed data lines, and to increase system reliability.

9.8 REEL CONTROL: BOARD "C"

The major function of this board is to interpret the output of the 8-bit data bus, at appropriate times, and convert it to a DC voltage (via a D-to-A converter) and feed it to the reel motor drive amplifiers. The data to be converted is latched via IC37, IC38, IC45 and IC46; the data is subsequently converted by DACs IC36 and IC44 (each of which are 8-bit devices). The resulting DC voltages are then routed through different stages by analog switches (type 14066) on the REEL CONTROL board; the switches provide the different tensions and gain levels required for various modes of transport operation such as FFWD, RWD, and PLAY at the 3 different speeeds and with differing reel sizes. Logic commands for the analog switching functions enter the board through buffers IC32 through IC35. After the analog switching, the DC voltages pass through gain stages (4558 dual op amp) and appear at the outputs to the motor drive amplifiers (IC58 and transistors Q2 through Q5 for the supply motor; IC54 and Q6 through Q9 for the takeup motor). Takeup and supply gain are adjusted by resistors VR10 (T.UP GAIN) and VR5 (SUP. GAIN), which are in the feedback loops of these output stages and are located on the board's front panel. This board also contains the speed calculation circuitry for fast winding and spooling modes

(forward and reverse) as well as back play mode; the calculated speed information is then applied to the reel motors to obtain the desired speed. Monostable multivibrator IC2 (a dual chip) and phase lock circuitry consisting of IC1, IC4, IC25 and IC55 produce the error voltage which corrects the motor speed. Individual adjustment of the multivibrator time constant is provided by trimmers VR11 through VR13 for back play speed adjustment, and VR2 for fast wind adjustment.

9.9 CAPSTAN CONTROL: BOARD "D"

The CAPSTAN CONTROL board takes clock signals from the MASTER CPU board, or external 9.6 kHz from a synchronizer, and compares these pulses to a signal derived from a magnetic tachometer mounted on the capstan motor itself. A DC error voltage is thus produced, and is fed to the capstan drive PC board (located beneath the transport). Divider chips IC37 through IC40 divide by "n" devices, which take the 9 MHz clock from the CPU and divide it to the appropriate frequency for phase locking with the tachometer output; the actual frequency will vary depending on the desired motor speed. Rotary switches SW1 and SW2 allow for very precise 1/10% and 1/100% adjustment of the capstan speed by changing the divider taps of IC38. The capstan clock frequency is compared to the capstan tachometer with a phase comparator circuit consisting of up/down counter IC10 and gates IC8 and IC9. At such time as the capstan tach frequency is exactly equal to the capstan clock, a 50% duty cycle square wave will be seen at test point CP2 (the output of the counter). The bi-color CAPSTAN LOCK LED on the board's front panel will be green when the capstan is locked, and red when it is out of lock. IC44 and IC45A are an integrator and bandpass filter which output a DC voltage that is based upon the duty cycle of the square wave output of IC10. IC45-B is the gain stage that is provide for adjustment of gain and damping constants for the 3 operational speeds at which the cpastan is designed to work. Front panel multi-turn trimmers VR4, VR5 and VR6 adjust the damping while front-panel trimmers VR7 through VR9 adjust the gain; the appropriate trimmers are selected by switching transistors.

The CAPSTAN CONTROL board also contains the clock generating circuitry for the CUE lever. This consists of a VCO (voltage controlled oscillator) IC48 and transistors Q19 and Q20, whose frequency is determined by DC amplifiers IC42 and IC43. When properly adjusted, the clock frequency observed at test point CP4 will vary from about 100 Hz to 10 kHz depending on the CUE lever position. In addition, a 2 MHz clock signal from the CPU board is divided by IC24, IC25 and IC26 into the various clocks that are required for the bias and erase signals, record timing and the audio test oscillator. External synchronizer inteface signals are conditioned via diodes D7, D8 and D9 and transistor Q7 and are changed to TTL levels. The presence of an external synchronizer signal is automatically detected by one-shot IC28,

buffer transistor Q9 and IC15. Any input signal whose frequency falls in a window between 20 kHz and 3 kHz will trigger this circuit and will latch a signal onto the data bus when input port 62 is enabled by the CPU. The CPU automatically changes the transport's dynamics to compensate for the synchronizer interface.

10

SECTION 10

MAINTENANCE

10.1 GENERAL

The Otari MTR-10 requires very little maintenance, other than routine electronic alignment to different tape batches, cleaning, and demagnetization. In addition to these day-to-day maintenance procedures, there are a few items that will benefit from occasional cleaning and/or lubrication. Such items, plus a few parts replacement procedures, are covered in this section of the manual. The maintenance items which are primarily covered elsewhere in this manual are listed below:

1. AUDIO ALIGNMENT

   A. Repro and Sel-Rep alignment (Section 4.5).
   B. Record alignment (Section 4.6).

2. TRANSPORT MECHANICAL & ELECTRO-MECHANICAL

   A. Cleaning and Demagnetization (Sections 4.2 & 4.3)
   B. Head geometry (Section 5.2).
   C. Access to the underside of the transport (Section 5.3)
   D. Pinch roller travel & pressure (Section 5.4).
   E. Brake tension (Section 5.5).
   F. Reel turntable height (Section 5.6).
   G. Tape lifters (Section 5.7).
   H. Reel tension and speed adjustment (Section 5.8).
   I. Tachometer phase (Section 5.9).
   J. Reel motor drive amplifier (MDA) gain (Section 5.10).
   K. Reverse play speed (Section 5.11).
   L. Capstan servo adjustment (Section 5.12).

10.2 REMOVING AND REINSERTING PRINTED CIRCUIT BOARDS

The printed circuit boards, sometimes referred to in this manual as circuit cards, in the MTR-10's card cage are equipped with convenient levers that uniformly distribute pressure when withdrawing the cards. To remove a board, grasp the end closest to the middle of the card on both of its levers, and pull forward.

Observe that some boards have metal shield plates. When replacing a circuit board with a shield, note that the board itself protrudes beyond the metal shield plate. It is the board, not the metal plate, that must be aligned with the upper and lower guides in the card cage. Slide the board in carefully, and then press firmly on both levers to seat the board fully home into its mating connector.

It makes no difference whether any of the AUDIO boards are exchanged with one another; they are numbered for convenience so that once aligned to a given head assembly, the boards can be removed and reinstalled without necessarily having to realign the machine.

10.3 REEL MOTOR REPLACEMENT

1. Turn power off and unplug the AC power cable.

2. Remove the three phillips screws that secure the reel turntable to its support flange.

3. Press the two buttons on the side of the transport to unlatch it, swing it up to vertical position, and let it down into locked-open position.

4. Reach up under the reel turntable, and press the turntable out into your waiting hand on the top side of the transport. Use care to retain the 3 split lock washers that were freed when you removed the phillips screws.

5. Loosen each of the two allen screws that secure the flange and spindle to the motor shaft several turns, and withdraw the assembly from the shaft. Note the screws were aligned with flats on the motor shaft.

6. Unplug the two cables leading to the motor assembly.

7. CAUTION

   Be sure to support the motor from beneath so it does not fall into the chassis.

   Remove the four Phillips head screws that secure the motor to its recessed mounting bracket (these screws became visible when the reel turntable was removed), and lift the motor out from below the transport.

8. Begin to install a replacement motor by following Steps 4 through 7 in the reverse order. Then slide the drive flange/spindle assembly over the motor shaft, using care to align the set screws so they are perfectly aligned to the flats on the motor shaft. Partially tighten the set screws, allowing for the next adjustment.

9. Adjust the reel turntable height so the top of the flange is 33.5 mm from the motor mounting bracket, as detailed in Section 5.6. Tighten the two flange/spindle set screws, and secure the turntable with the 3 phillips screws and split lock washers.

10. Check and adjust the reel tension servo, if necessary, as described in Section 5.8.

11. Check and adjust the brake tension, if necessary, as described in Section 5.5.

10.4 BRAKE PAD REPLACEMENT

Brake pads receive very little wear. Unnless damaged by some abnormal and unlikely occurence, they will not require replacement. This is because the brakes are only used during unloaded mode or in the event of power failure, to prevent tape spillage; dynamic braking is the primary means of slowing and stopping the reels. Due to the close proximity of delicate reel motor servo tachometer discs and sensors to the brakes, we do not recommend user replacement of brake pads. Brake tension may be adjusted, however, as detailed in Section 5.5.

10.5 METER OR METER LAMP REPLACEMENT

The VU meter lamps are operated at less than their rated voltage, and should therefore have a very long life. If a lamp does burn out, a replacement lamp may be obtained from Otari.

1. Loosen the allen-head set screws on all control knobs on the audio control/monitor panel, and remove the knobs.

2. Remove the four flush-mounted (flat head) allen-head screws from the top and bottom front edges of the audio control/monitor panel.

3 Unscrew the knurled thumb-screws on the audio control/monitor panel, pivot the panel down, and remove the pair of cadmium plated phillips head screws that secure each side of the sub-panel to the brackets behind the front panel.

4. Carefully lift the sub-panel out from behind the front panel.

5. For lamp replacement, locate the meter whose lamp you wish to replace unsolder the old meter lamp(s) and solder the new one(s) in place.

6. For meter replacement, first unscrew the four phillips head screws that connect wires to the rear of the meter (making note of which colored wires go to each terminal). Notice that four screw posts from the meter protrude through the metal sub panel, but only two or three of these posts are secured with nuts. Use a suitable nut driver to loosen the nuts. Retain them, the split lockwashers, and the flat washers. (Note that one nut holds the peak LED board to the meter). Now withdraw the meter from the sub panel, and install a new one (replacing the four leads, too).

NOTE: If the meter pointer does not rest exactly on the last line of its scale, adjust the meter zero screw (centered below the scale on the front of the meter) so the pointer rests at the line just below -20 VU. This can be done later, if desired, through a hole in the front panel.

7. Reinstall the sub-panel by following above Steps 1 through 4 in reverse order. It may be a time saver to first turn POWER On and check the meter (or meter lamp) for proper operation, using care not to short any conductors or contacts on the sub panel to chassis ground.

10.6 CAPSTAN PINCH ROLLER REMOVAL AND REPLACEMENT

1. Lift off the rear head cover assembly after removing the two allen head screws at the rear of that cover.

2. Remove the allen head screw from the top of the pinch roller assembly, and lift off the roller.

3. Install a new pinch roller, tighten the retaining screw, and replace the rear head cover.

10.7 TAKEUP ROLLER GUIDE REMOVAL AND REPLACEMENT

1. The right-hand (takeup) roller guide is held onto the transport deck plate with a single threaded stud (early versions). (On later MTR-10s, it is necessary to first grasp the roller assembly and remove the keeper nut below the transport.) Refer to figure 10-1.

2. Press down on the protective flange around the guide roller, and turn it counterclockwise to remove the flange.

3. Lift the guide from the top of the transport.

4. Reinstall by following Steps 1 through 3 in reverse order.

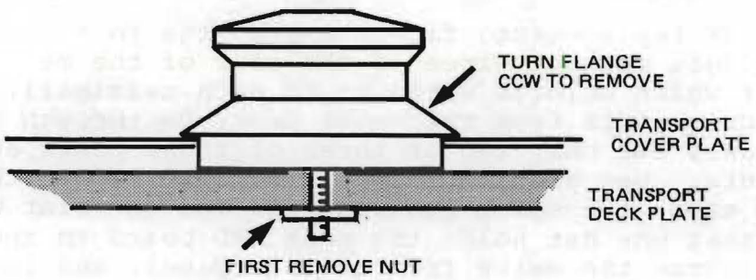


FIGURE 10-1. TAKEUP ROLLER GUIDE DISASSEMBLY

10.8 IMPEDANCE ROLLER (SUPPLY REEL ROLLER) REMOVAL AND REPLACEMENT

1. Loosen the two allen head set screws that secure the fly wheel to the bottom of the roller shaft (below the transport), and slide the fly wheel off the shaft. Refer to figure 10-2.

2. Using a suitable spanner wrench (or a strong pair of needle-nose pliers), unscrew the spline that clamps the roller assembly to the bottom of the deck plate. Remove the spline and spacer.

3. Withdraw the roller assembly from the top of the deck plate.

4. Reinstall by following Steps 1 to 3 in the reverse order.

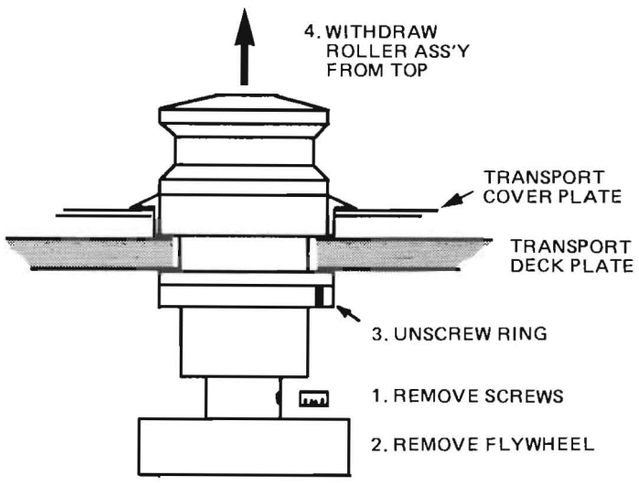


FIGURE 10-2. IMPEDANCE ROLLER DISASSEMBLY

10.9 TACHOMETER ROLLER REMOVAL AND REPLACEMENT

1. Unplug the cable from the tachometer circuit board beneath the deck plate.

2. Remove the phillips head screw that holds the right side of the tach board bracket to the deck plate, and loosen the screw on the left side of the bracket. 3. Rotate the bracket (and circuit board) away from the tach roller so the tach disk is clear of the LED/LDR assembly on the circuit board. Then remove the remaining screw from the bracket and set the board aside. USE CARE NOT TO WARP THE TACH DISK.

4. Remove the two phillips head screws that secure the perforated metal shield around the tach disk to the deck plate, and carefully lift off the shield.

5. Loosen the two allen head set screws that secure the tach disk to the bottom of the tach shaft, and slide the disk off the shaft. (Refer to figure 10-3.

6. Using a suitable spanner wrench (or a strong pair of needle nose pliers), unscrew the spline that clamps the tach roller assembly to the bottom of the deck plate. Remove the spline and spacer.

7. Withdraw the tach roller assembly from the top of the deck plate.

8. Reinstall by following Steps 1 to 7 in the reverse order; then calibrate the tach phase by following the procedure in Section 5.9.

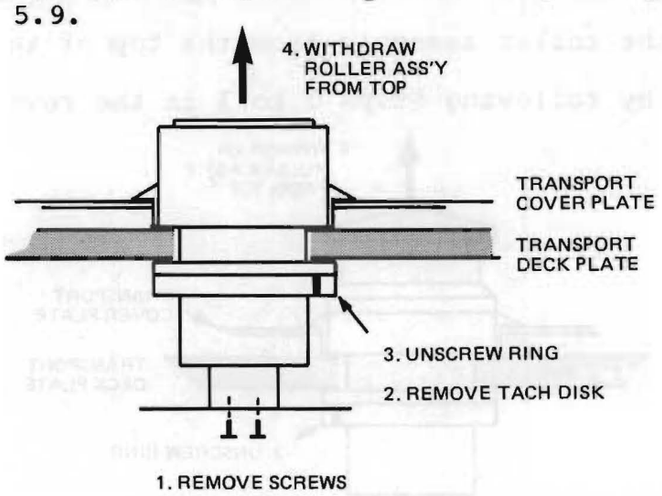


FIGURE 10-3. TACHOMETER ROLLER DISASSEMBLY

10.10 CLEANING AND LUBRICATION

Refer to Section 4.2 for cleaning the tape path. There are only a few other areas that should be checked periodically for dirt, such as the tape lifter and pinch roller solenoid linkages. The Capstan Motor of the MTR-10/12 contains an oilite bearing at the front end, which requires lubrication.
USE ONLY OTARI OIL (part-no. PZ9E003)
Initial lubrication is performed on equipment receipt. To access the bearing for lubrication, remove the capstan shaft dust cap. Apply 3 drops of oil to the form ring surrounding the bronze colored oilite bearing. For the periodical lubrication, apply 1 drop of oil every 3 to 6 months depending on machine usage. Do not over lubricate, and be careful not to apply oil to the portion of the capstan shaft which contacts the tape. The guide roller bearings are permanently lubricated so they do not require oiling.

10.11 REEL MOTOR DRIVE CIRCUIT BOARDS REMOVAL AND REPLACEMENT

These circuit boards are located beneath the transport between the reel motors. Power transistors are mounted on heat sinks on the MTR-10 rear panel. To remove the boards:

1. Turn power OFF and unplug the AC line cord.

2. Unlatch and lift up the transport, locking it open.

3. Remove the 3 cable connectors from the chassis connectors on the board to be removed. (If both boards are to be removed, mark the cables to avoid possible confusion upon reinstallation).

4. Squeeze both metal release tabs on the end of the circuit board together, and pull away from the transport to slide the board out.

5. Reinstall the board (or a replacement) by following Steps 1 through 4 in reverse order.

10.12 SAFETY SHUT-OFF SWITCH ASSEMBLY REMOVAL AND REPLACEMENT

The safety shut-off arm with its LED/LDR assembly is held to the deck plate with two screws, and comes off in once piece after unplugging the connector on the assembly and removing the screws. It is important when reinstalling the assembly to position the arm so it does not bind against the side of the nearby capstan motor.

10.13 SWING ARM ASSEMBLY REMOVAL AND REPLACEMENT

To gain access to the swing arm assembly, it is necessary to first remove the deck plate cover, which entails removing several other components and assemblies.

1. Remove the head assembly rear cover (two screws) and the head assembly front dress plate (two screws).

2. Remove the takeup guide roller, the impedance roller, the tach roller, and the safety shut-off switch as per previous instructions in Section 10.

3. Remove the allen head screw from the top of the pinch roller, and lift off the roller. Remove swing arm roller by turning the screw on the top.

4. Remove the four flat-head allen screws from the extreme corners of the deck plate cover, the 2 round-head allen screws from the center of the deck cover plate (not the control panel screws), and lift the cover off the transport.

5. Undo the dashpot arm from the base of the swing arm assembly (beneath the deck plate) by pulling the E-clip off the post on the arm, and unhooking the spring from the arm.

6. Loosen the set screw that holds the base of the swing arm assembly to the shaft (beneath the deck plate), and pull the assembly off the shaft.

7. The bearing housing may now be removed by removing the two screws that hold it to the deck plate.

8. Reassemble by following Steps 1 through 6 in reverse order. Be sure to realign the tachometer phase.

10.14 CAPSTAN MOTOR REMOVAL AND REPLACEMENT

1. Turn Off the Power to the machine.

2. Remove the Pinch Roller and Cap, using a 2.5mm hex key.

3. Remove the Capstan Shaft Dust Cap by turning it counter-clockwise.

4. Latch the Transport open, and locate the Capstan Motor.

5. Disconnect the cable which leads from the Motor to the nearby Printed Circuit Board (PCB).

6. Remove the four screws that attach the Motor to its mounting posts, or to the cast deck plate.

7. Remove the Motor from the Transport.

8. Install the new Motor by following Steps 4 - 7 in reverse.

9. Before replacing the Dust Cap, apply 3 drops of OTARI OIL (PZ9E003) to the cavity surrounding the Capstan Motor upper oilite bearing.

   CAUTION: USE ONLY OTARI OIL.

10. Replace the Capstan Shaft Dust Cap, Pinch Roller and Pinch Roller Cap.

11. Adjust the Pinch Roller pressure for 2,500 grams, following the procedure in Section 5.4 of the MTR-10/12 Manual.

12. Confirm that the Capstan Motor Servo Gain and Damping are correctly adjusted using the procedure in Section 5.12 of the MTR-10/12 Manual.

11

SECTION 11

SPECIFICATIONS

11.1 TAPE TRANSPORT

TRACK CONFIGURATION:	MTR-10 1/4" version: 1/4-inch (6.3 mm) wide tape, 2 channel, 2 track or DIN stereo [1/4-inch mono (full track) optional] MTR-10 1/2" version: 1/2-inch (12.6 mm) wide tape, 4 channel, 4 track, or 2 channel, 2 track
TAPE SPEEDS:	High speed version: 30 ips (76.2 cm/s), 15 ips (38.1 cm/s), and 7.5 ips (19.05 cm/s) Low speed version: 15 ips, 7.5 ips and 3.75 ips (9.53 cm/s)
RWIND TIME:	120 sec. for 2500 ft
REELS SIZE:	MTR-10 5 inches (12.7 cm) to 10-1/2 inches diameter (26.8 cm), MTR-12 up to 12 inches (30.5 cm) automatic tension compensation. NAB or EIA hubs on MTR-10-2, NAB hub only on MTR-10-4 & MTR-12-4.
HEADS:	Plug-in head blocks with full access to independent head azimuth adjustment
MOTORS:	3 DC servo controlled. 9600 Hz nominal PLL microprocessor controlled capstan
TAPE SPEED DEVIATION:	±0.03% maximum
WOW AND FLUTTER: (Peak wtd. per DIN 45507)	30 ips : less than 0.04% 15 ips : less than 0.06% 7.5 ips : less than 0.08% 3.75 ips: less than 0.12%
PITCH CONTROL:	±20% continuously variable control, ips or percentage readout with 0.1% precision
CUE CONTROL:	Cue button activates lever for variable speed tape winding (bidirectional) proportional to cue lever; button also defeats tape lifters in fast wind/ rewind modes.

TAPE TIME COUNTER: Five digit LED readout from tachometer/ logic measurement circuit; indicates tape time in hours, minutes, and seconds (real time, plus or minus)

11.2 ELECTRONICS

LINE INPUT: Active balanced (transformerless), 20 kOhm impedance, +4 dBm nominal level. Optional transformers (one #ZA-52W per channel) have 10 kOhm input impedance

LINE OUTPUT: Active balanced (direct coupled), less than 5 Ohms source impedance, +28 dBm maximum output level into 200 Ohms or greater. Optional transformers (one #ZA-52X per channel) have 600 Ohms source impedance

HEADPHONE OUTPUT: Stereo phone jack for headphones with 8 Ohm or higher impedance

EQUALIZATION: At 30 ips, AES. At 3.75 ips, 7.5 ips or 15 ips, NAB or IEC (CCIR), switchable. Adjustable record phase compensation for all speeds

BIAS FREQUENCY: 250 kHz

CALIBRATION LEVELS: Switchable: NAB 185 nWb/m (L) or 250 nWb/m (M), or IEC 320 nWb/m (H)

NOTE: Performance measured with Scotch #226 tape at 250 nWb/m operating level, unless otherwise specified.

FREQUENCY RESPONSE: (MTR-10-4 & MTR-12-4)

Record/Reproduce	3.75 ips:	20 Hz - 10 kHz	+2/-3 dB
	(-20 dB ref 250 nWb/m)		
Record/Reproduce	7.5 ips :	20 Hz - 18 kHz	+2/-3 dB
Sel-Rep		30 Hz - 5 kHz	+/-3 dB
	(-10 dB ref 250 nWb/m)		
Record/Reproduce	15 ips :	30 Hz - 20 kHz	+2/-3 dB
Sel-Rep		30 Hz - 10 kHz	+/-3 dB
	(ref 250 nWb/m)		
Record/Reproduce	30 ips :	60 Hz - 28 kHz	+2/-3 dB
Sel-Rep		60 Hz - 20 kHz	+/-3 dB
	(ref 250 nWb/m)		

(MTR-10-2 & MTR-12-2)

Record/Reproduce	3.75 ips: 20 Hz - 10 kHz +2/-3 dB (-20 dB ref 250 nWb/m)
Record/Reproduce Sel-Rep	7.5 ips : 20 Hz - 18 kHz +2/-3 dB 30 Hz - 5 kHz +/-3 dB (-10 dB ref 250 nWb/m)
Record/Reproduce Sel-Rep	15 ips : 30 Hz - 20 kHz +2/-3 dB 30 Hz - 10 kHz +/-3 dB
Record/Reproduce Sel-Rep	30 ips : 40 Hz - 28 kHz +2/-3 dB 60 Hz - 20 kHz +/-3 dB
DISTORTION:	Less than 0.3% third harmonic distortion at 1 kHz ref 250 nWb/m
CROSSTALK:	MTR-10-2 & MTR-12-2, 2 tracks, 4 tracks better than 55 dB MTR-10-4 & MTR-12, 1/2" 2 tracks better than 60 dB MTR-10-2 DIN Stereo better than 45 dB (Measured from tape in Repro mode using 1 kHz @ 250 nWb/m on adjacent track).
DEPTH OF ERASURE:	MTR-10-2 & MTR-12-2, 1/2" 2 tracks better than 80 dB (1 kHz) MTR-10-4 & MTR-12-4, better than 75 dB (1 kHz) MTR-10-2 DIN Stereo, better than 70 dB (1 kHz)

SIGNAL TO NOISE RATIO: (Unweighted with audio filter (30 - 18 kHz) at 320 nWb/m, NAB or AES)		(MTR-10-2) (MTR-12-2)	(MTR-10-4) (MTR-12-4)
	30 ips	62 dB	60 dB
	15 ips	59 dB	57 dB
	7.5 ips	60 dB	58 dB

TEST OSCILLATOR:	100 Hz, 1 kHz, and 10 kHz sine wave; 1 kHz and 10 kHz square wave

11.3 PHYSICAL

POWER REQUIREMENTS:	100, 117, 200, 220 or 240 Volts single phase AC, 50 Hz or 60 Hz; 180 Watts
OPERATING ENVIRONMENT:	40°F to 104°F (5°C to 40°C), 20-80% RH

WEIGHT: MTR-10 model, approx. 155 lbs (70 kg); approximately 230 lbs (105 kg) in shipping container
MTR-12 model, approx. 40 lbs heavier

MOUNTING: All modules, standard E.I.A. 19" rack mount; available without console

DIMENSIONS: See drawings accompanying these specifications.

11.4 ACCESSORIES

STANDARD: Hold down for reel with NAB hub (X2), reel adjusting disk (shim), 10-1/2" NAB empty reel, two large and two small replacement lamps, AC cord, PARALLEL I/O and NOISE REDUCTION mating connectors, lubrication oil (PZ9E003), operation and maintenance manual

OPTIONAL: Model CB-111 Remote Control Box (with zero search, pitch control, illuminated transport control buttons, and cable)

Model CB-102 Remote Control Box (with transport control buttons and cable)

Model CB-109 Auto Locator with full shuttle/search capability, 10-memory cue capacity, search zero; includes cable

ZA-52W floating input transformer (10 kOhms, one required per channel)

ZA-52X floating output transformer (600 Ohms, one required per channel)

PB-76X extender card

ZA-53V RS-232 interface adapter (transport control only)

ZA-52Y small reel hold down

ZA-54H DIN Adapter (10-1/2" reel)

ZA-54I DIN Adaptor (12" reel)

KW0HŌ 1/4" NAB reel hold down

KW0HC 1/2" NAB reel hold down

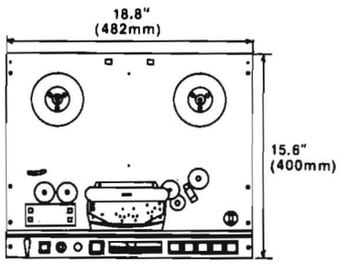
ZA-51A NAB empty reel 10-1/2" inch 1/4" tape

ZA-51H NAB empty reel 10-1/2" inch 1/2" tape

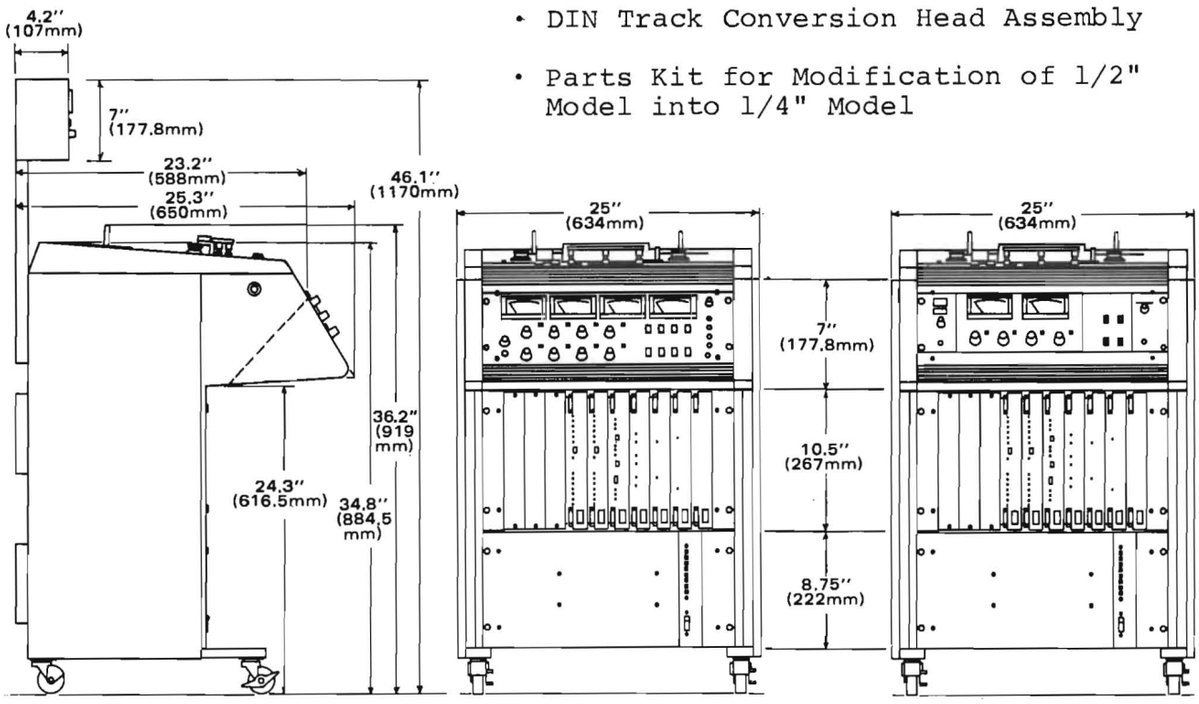
ZA-53V RS-232C Interface Unit

ZA-55H Conversion Kit to Center Track Time Code Version

EC-401/402 Resolver Units



- Overbridge Conversion Kit
- Standard Console Conversion Kit
- Full Track Conversion Head Assembly
- DIN Track Conversion Head Assembly
- Parts Kit for Modification of 1/2" Model into 1/4" Model



In the interest of product improvement, Otari reserves the right to change specifications without notice or obligation. Manufactured in Japan by Otari Electric Co., Ltd.

12

SECTION 12

PARTS LISTS AND P.C.B. ASSEMBLIES

12.1 GENERAL

The following P.C.B. pattern layout drawings and parts lists are provided for service reference. Parts list includes only main parts or the parts difficult to obtain in the field. Also the lists include the parts which should be replaced with the exact same parts supplied by OTARI to maintain the performance. Many diodes, transistors, and ICs are well described in the schematics attached to the machine, so to find out the correct parts number of those parts you need, refer to the schematics.

12.2 PARTS LISTS

You will find drawings for the following P.C.B.s in this section.

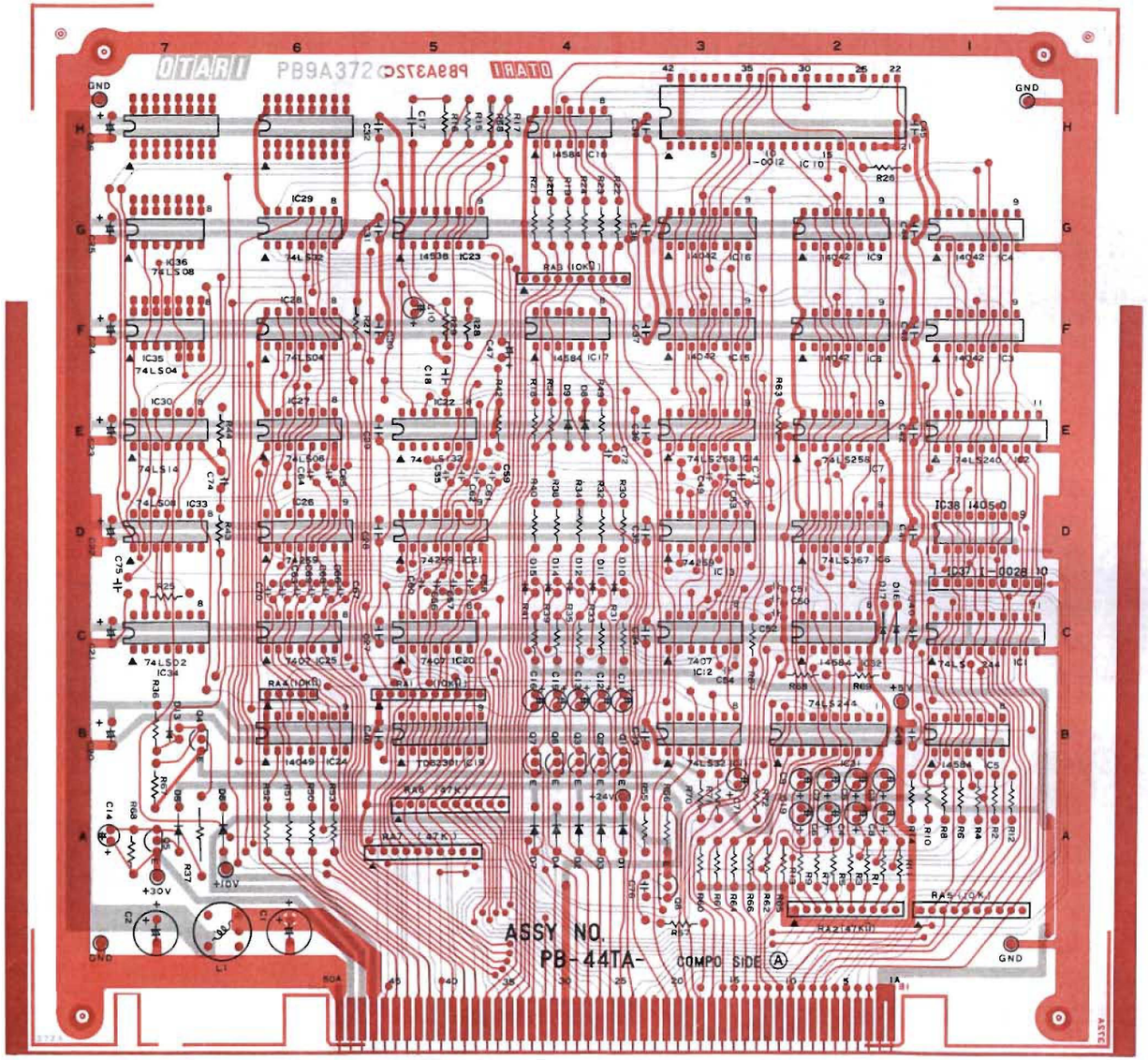
MTR-10, MTR-12 P.C.B. Ass'y

1. PB-44TA Transport Control P.C.B. Assembly
2. PB-4GEB Master CPU P.C.B. Assembly
3. PB-44VA Reel Control P.C.B. Assembly
4. PB-44WA Capstan Control P.C.B. Assembly
5. PB-44XA Audio Control P.C.B. Assembly
6. PB-14XA Audio Amplifier P.C.B. Assembly
7. PB-62L Power Supply P.C.B. Assembly
8. PB-45MA Speed Calculator P.C.B. Assembly
9. PB-45C Capstan Drive P.C.B. Assembly
10. PB-45D Reel Size Detect P.C.B. Assembly

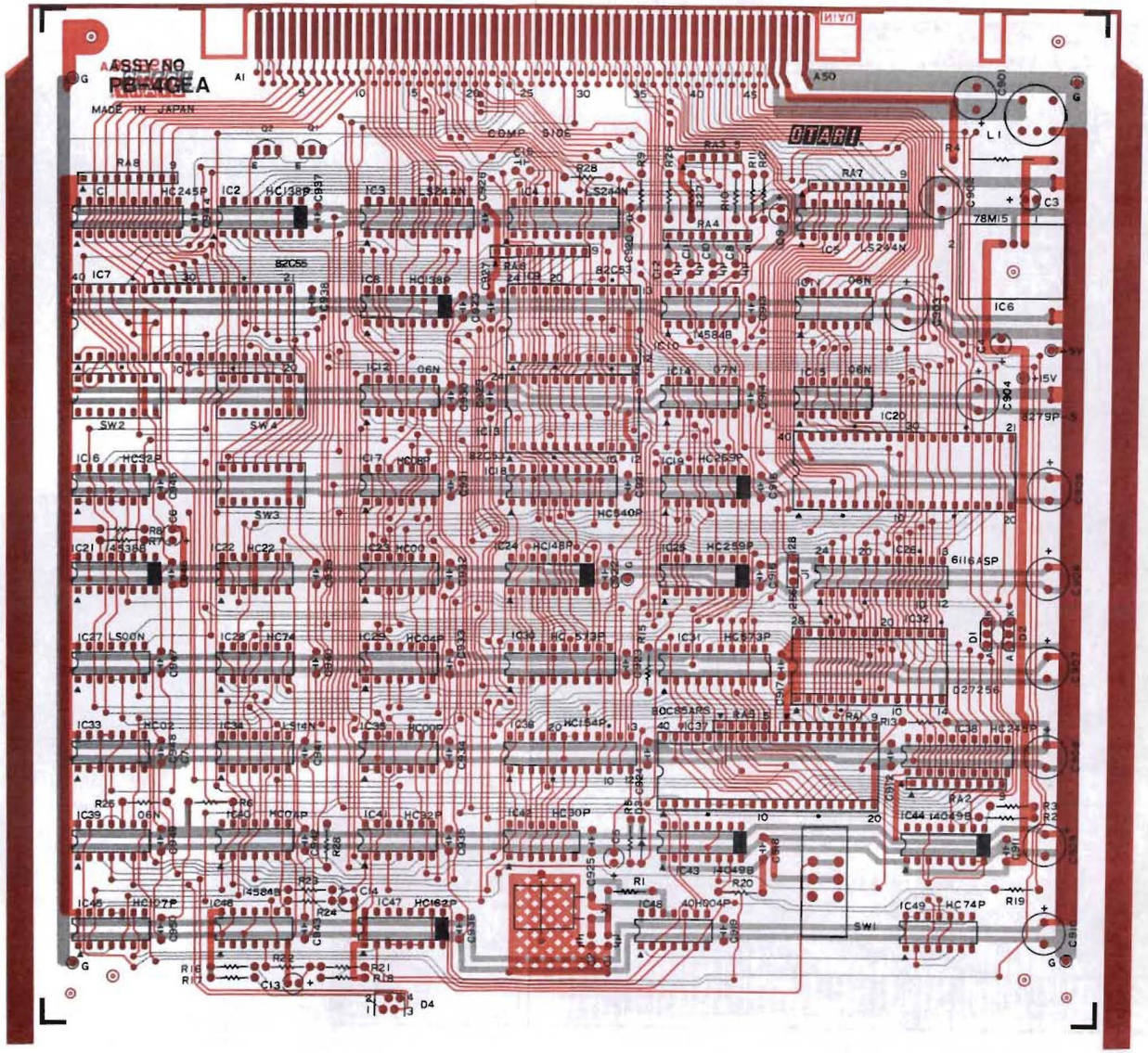
PARTS LIST 1 PB-44TA TRANSPORT CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A372C	-
IC10	IC	I-0012	-
IC19	IC	ITD62301	-
IC37	IC	I-0028	-
D10∿15	Diode	PNTLR124	-
L1	Inductor	IN19069	47 μH
R37	Resistor	R8BJ102M	1W 1kΩ
C20∿26	Capacitor	C710008M	10μF 16V Tantalum
-	Check Pin	CN901157	

1. PB-44TA TRANSPORT CONTROL P.C.B. ASSEMBLY



2. PB-4GEA MASTER CPU P.C.B. ASSEMBLY



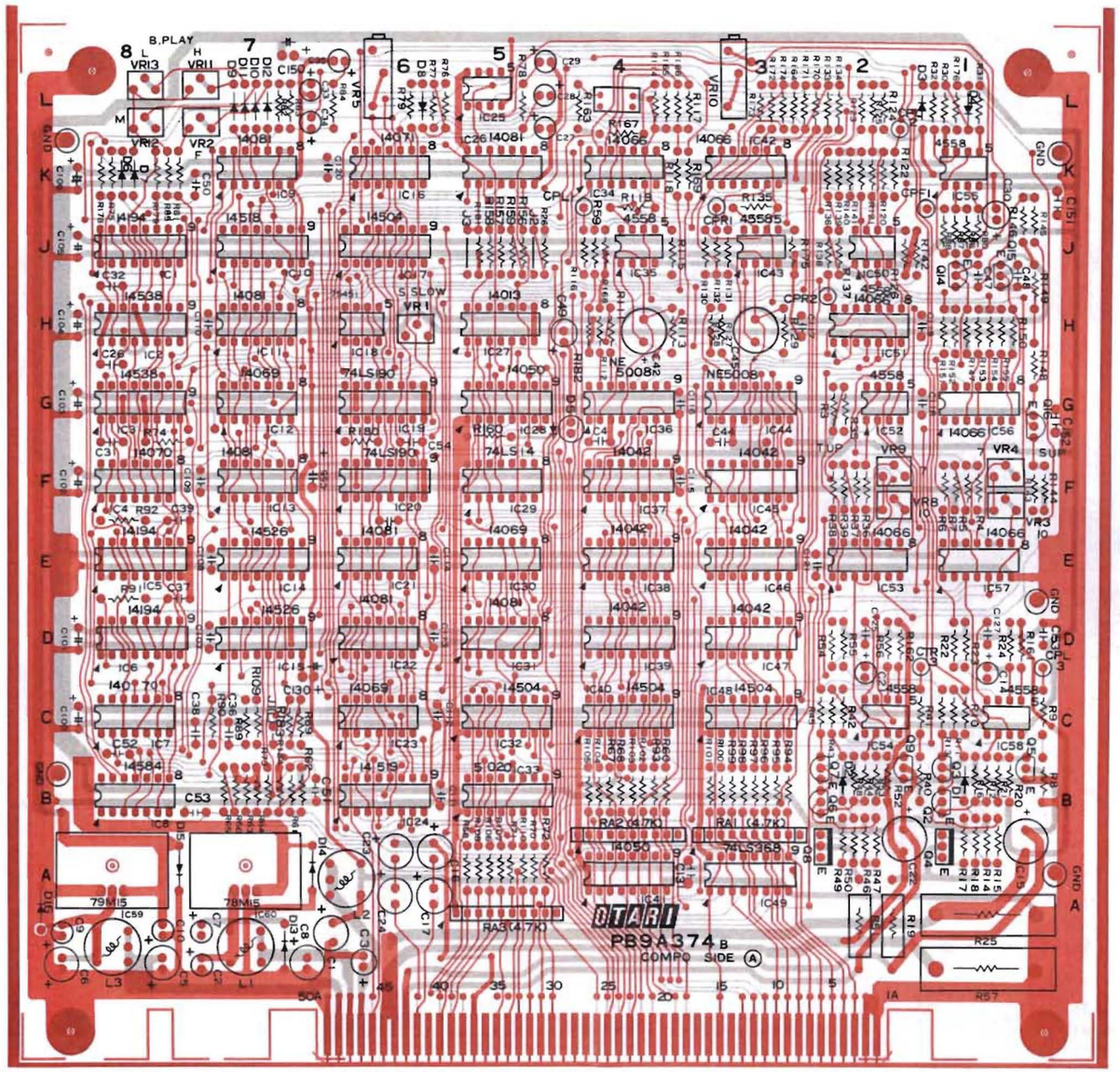
PARTS LIST 2 PB-4GEA MASTER CPU P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9B186A	-
-	ROM Assembly	PG-1111	-
IC6	IC	IHC78M15	-
IC7	IC	IM5L8255	-
IC9,13	IC	IM5L8253	-
IC20	IC	IM5L8279	-
IC26	IC	I-0134	-
IC37	IC	IM5L8085	-
IC48	IC	IJ004P	-
Q1	Transistor	Q-0010	-
Q2	Transistor	Q-0006	-
D1,2	Diode	PN-0230	-
D3	Diode	PN-0199	-
D4	Diode	PN-0161	-
L1	Inductor	IN19069	47 μH
RA1,2,5	Resistor Array	R94-132	4.7kΩx8
RA3	Resistor Array	R94-079	10kΩ x4
RA4	Resistor Array	R94-178	10kΩ x4
RA6	Resistor Array	R94-136	10kΩ x8
RA7	Resistor Array	R94-124	1kΩ x8
RA8	Resistor Array	R94-075	4.7kΩx4
R2	Resistor	R8AJ471M	1/2W470Ω
R4	Resistor	R8CJ620M	2W 62Ω
SW1	Switch	WH12121	-
SW2∿4	Switch	WH98095	-
X1	Crystal	PZ4C027	-
	Heat Sink	PZ4B015	-

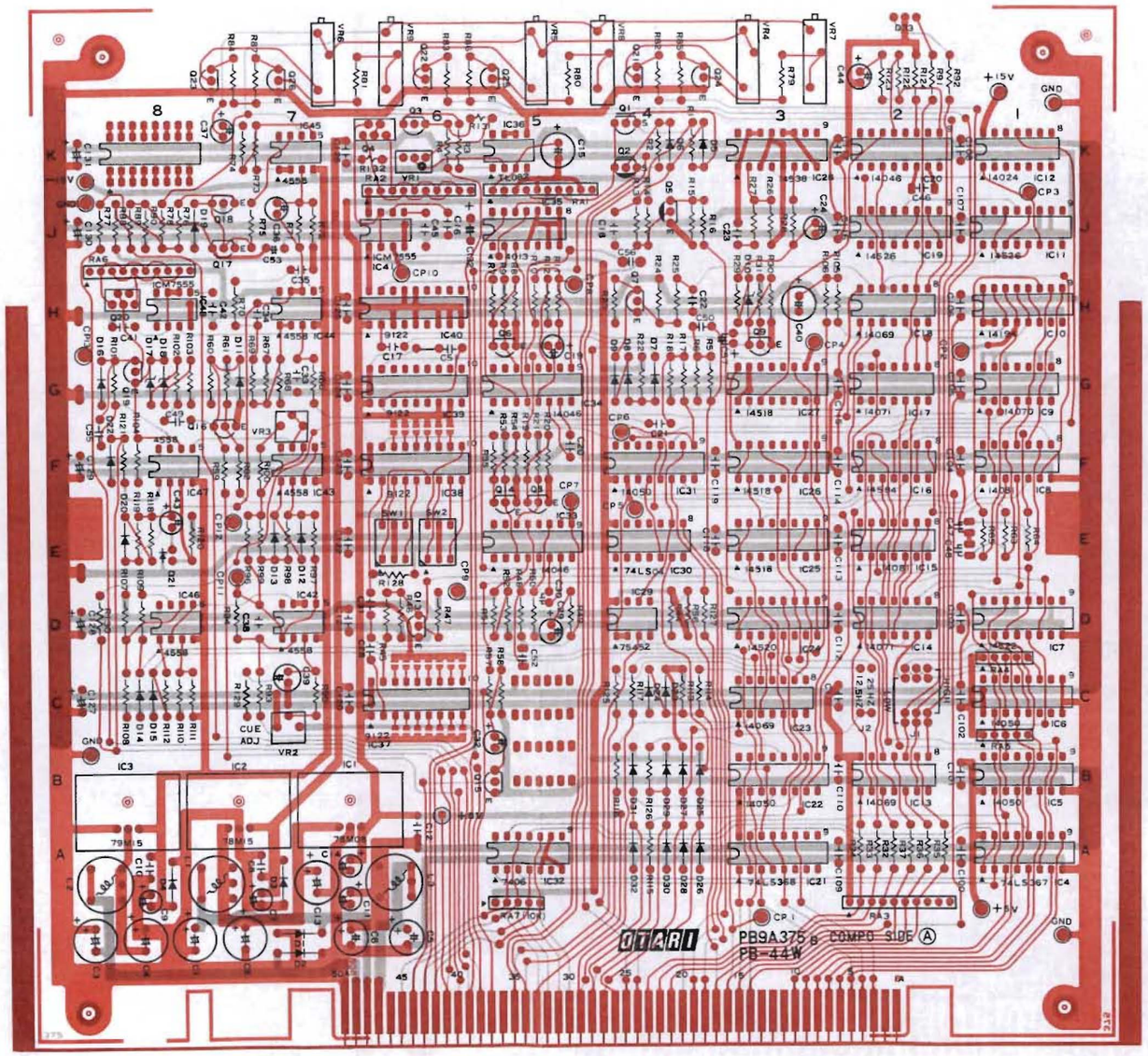
PARTS LIST 3 PB-44VA REEL CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A374B	-
IC25, 35 43, 50 52, 54 55∿58	IC	IHC4558C	-
IC33	IC	ITC5020B	-
IC36, 44	IC	INE5008N	-
IC59	IC	IHC78M15	-
	Diode (LED)	PNTLR124	Red
L1∿3	Inductor	IN19069	47 μH
VR1∿4 8, 9 11∿13	Potentiometer 20kΩ	RV424208	
VR5, 10	Potentiometer 10kΩ	RV414172	SUP GAIN TUP GAIN
R19	Resistor	R8CJ201M	2W 200Ω
R25, 57	Resistor	R93-013M	7W 0.47Ω
	Resistor Network	R94-018D	4.7kΩ
SW1	Switch	WH92021	SELECTION 1/2" or 1/4"
-	Check Pin	CN901157	
-	Heatsink	PZ4B015	

3. PB-44VA REEL CONTROL P.C.B. ASSEMBLY



4. PB-44WA CAPSTAN CONTROL P.C.B. ASSEMBLY



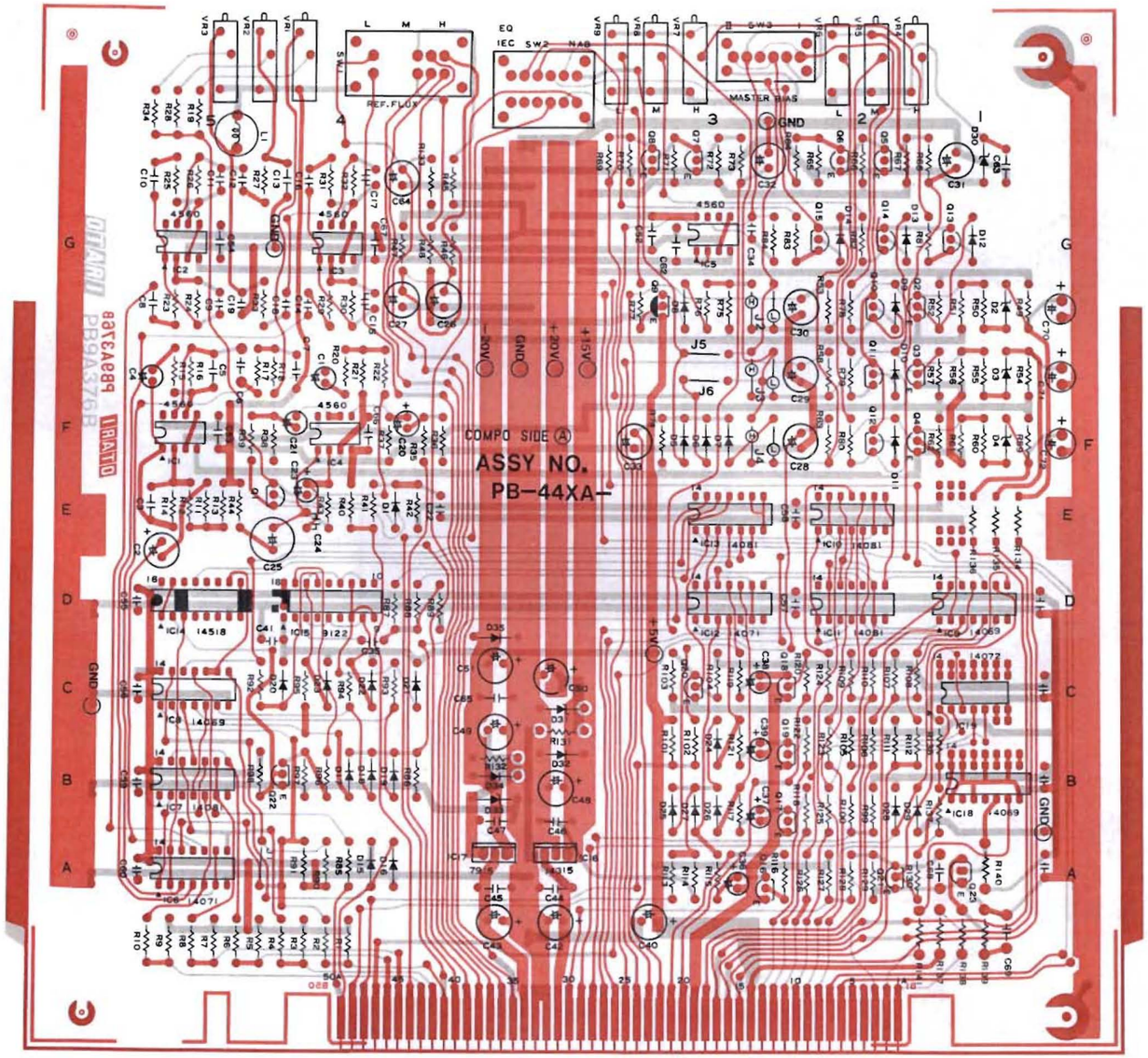
PARTS LIST 4 PB-44WA CAPSTAN CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A375B	-
IC1	IC	IHC78M08	-
IC41, 48	IC	I-0018	-
IC42∿47	IC	IHC4558C	-
D10, 18	Diode	PN-0016	-
D17	Diode	PN-0034	-
D33	LED	PNLN16WP	-
L1∿3	Inductor	IN19069	-
VR1	Potentiometer 20kΩ	RV424249	
VR2	Potentiometer 10kΩ	RV414207	CUE DC OFFSET ADJ.
VR3	Potentiometer 50kΩ	RV454210	CUE FREQ. ADJ.
VR4∿6	Potentiometer 100kΩ	RV415175	H·M·L DAMP
VR7∿9	Potentiometer 10kΩ	RV414172	H·M·L GAIN
SW1, 2	Switch	WH91015	
-	Check Pin	CN901157	
-	Heatsink	PZ4B015	-

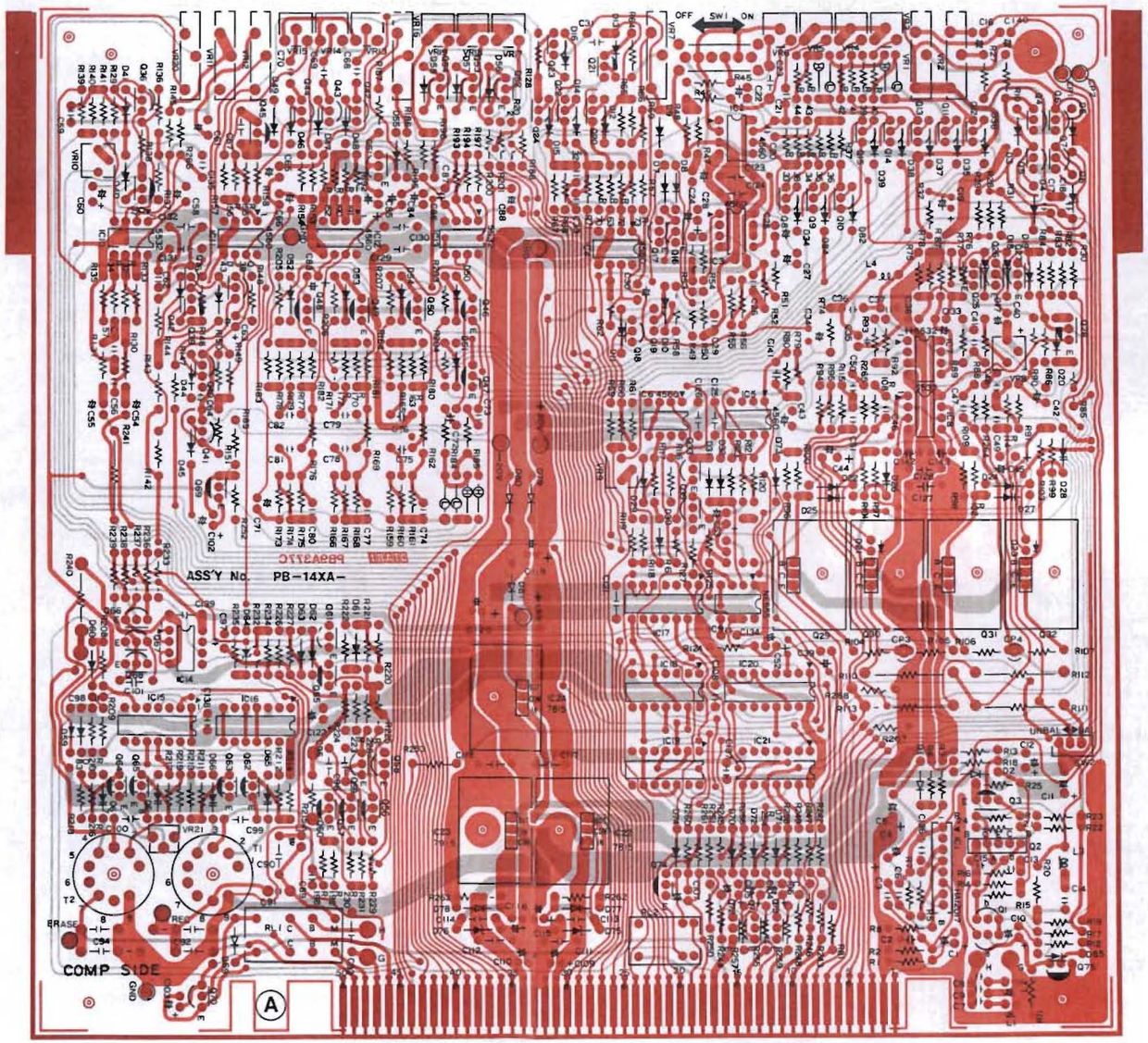
PARTS LIST 5 PB-44XA AUDIO CONTROL P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A376B	-
IC15	IC	ITC9122P	-
IC16	IC	I-0026	-
IC17	IC	I-0027	-
D2∿4, 31	Diode	PN-0053	-
D30, 33	Diode	PN-0011	-
L1	Inductor	IN19063	-
VR1 ∿ 3	Potentiometer 10kΩ	RV414172	Test Osc.
VR4 ∿ 9	Potentiometer 50kΩ	RV454174	MASTER BIAS
SW1	Switch	WH32007	REF FLUX
SW2	Switch	WH34008	EQ
SW3	Switch	WH32003	MASTER BIAS
-	Check Pin	CN901157	Check Terminal

5. PB-44XA AUDIO CONTROL P.C.B. ASSEMBLY



6. PB-14XA AUDIO AMPLIFIER P.C.B. ASSEMBLY



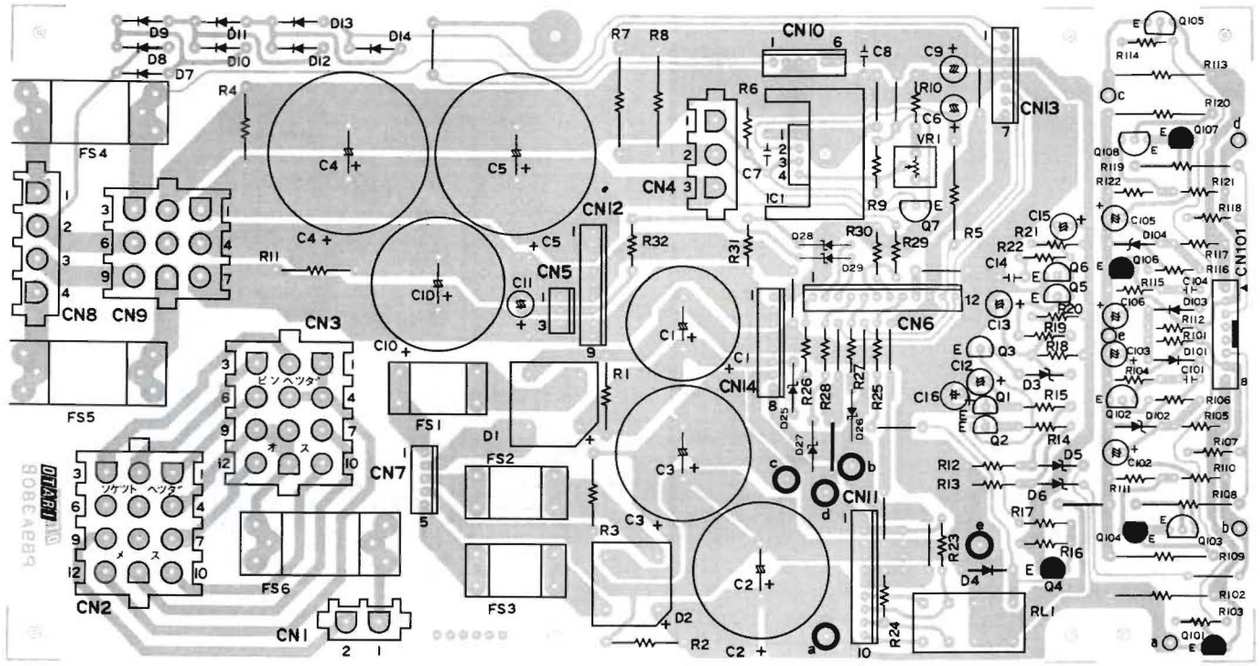
PARTS LIST 6 PB-14XA AUDIO AMPLIFIER P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A377C	-
IC16	IC	I-0026	-
IC17	IC	I-0027	-
T1, 2	Transformer	TF31019	BIAS OUTPUT
L1, 2	Inductor	IN19034	100 μH
L3, 4	Inductor	IN19049	1.8 mH
L5	Inductor	IN19074	390 μH
VR1,2,7, 12 & 16	Potentiometer 10kΩ	RV414172	REP.LEV./SRL/OUTPUT SRL/ INPUT SRL/ REC LEV.
RV3	Potentiometer 2kΩ	RV423216	REP. EQ. HIGH
VR4, 5	Potentiometer 5kΩ	RV453218	REP. EQ. MID LOW
VR6, 20	Potentiometer 50kΩ	RV454174	LOW FREQ. COMP./REC BIAS
VR8	Potentiometer 5kΩ	RV453206	OUTPUT LEVEL
VR9	Potentiometer 50kΩ	RV454210	PEAK TRIGGER LEV.
VR10	Potentiometer 20kΩ	RV424208	TEST OSC. LEVEL
VR11	Potentiometer 20kΩ	RV424173	INPUT SENSITIVITY
VR13∿15	Potentiometer 50kΩ	RV454222	REC. EQ. HIGH MID LOW
VR17∿19	Potentiometer 20kΩ	RV424220	PHASE COMP. HIGH MID LOW
VR21	Potentiometer 500Ω	RV452202	ERASE SYMMETRY
R110∿113	Resistor	R8CJ180M	2W 18Ω
R215	Resistor	R8BJ221M	1W 220Ω
R240	Resistor	R8CJ181M	2W 180Ω
RL1	Relay	RY2YC052	REC RELAY
RL2	Relay	RY1YC023	N.R. REMOTE RELAY
SW1	Switch	WH32003	LOW FREQ. COMP.
SW2	Switch (UNBAL/BAL)	WH31016	LINE OUTPUT MODE
-	Check Pin	CN901157	
-	Connector	CN608120	8P
-	Heatsink	PZ4B015	-

PARTS LIST 7 PB-62L POWER SUPPLY P.C.B. ASSEMBLY

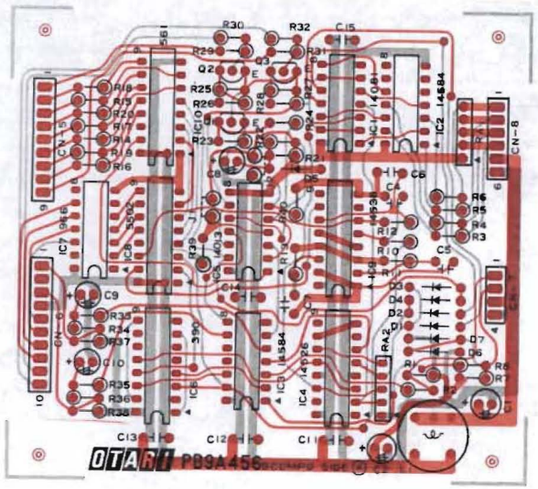
Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A380B	-
D3	Diode	PNR3.6EB	-
D5	Diode	PN-0074	-
D6	Diode	PN-0053	-
D25∿29 102, 104	Diode	PN-0044	-
VR1	Potentiometer 500Ω	RV452202	
R5,108,109 119, 120	Resistor	R8CJ181M	2W 180Ω
R7, 8, 102, 113	Resistor	R7DJR24M	2W 0.24Ω
RL1	Relay	RY2YC052	DC 5V
-	Connector	CN402081	Nylon Socket 2P
-	Connector	CN403043	Nylon Socket 3P
-	Connector	CN403082	Nylon Socket 3P
-	Connector	CN403083	Nylon Socket 3P
-	Connector	CN405045	Nylon Socket 5P
-	Connector	CN406046	Nylon Socket 6P
-	Connector	CN407047	Nylon Socket 7P
-	Connector	CN408048	Nylon Socket 8P
-	Connector	CN408227	Nylon Socket 8P
-	Connector	CN409049	Nylon Socket 9P
-	Connector	CN409085	Nylon Socket 9P
-	Connector	CN410050	Nylon Socket 10P
-	Connector	CN412051	Nylon Socket 12P
-	Connector	CN412086	Nylon Socket 12P
-	Connector	CN412259	Nylon Socket 12P
-	Heatsink	PZ4B015	-

7. PB-62L POWER SUPPLY P.C.B. ASSEMBLY

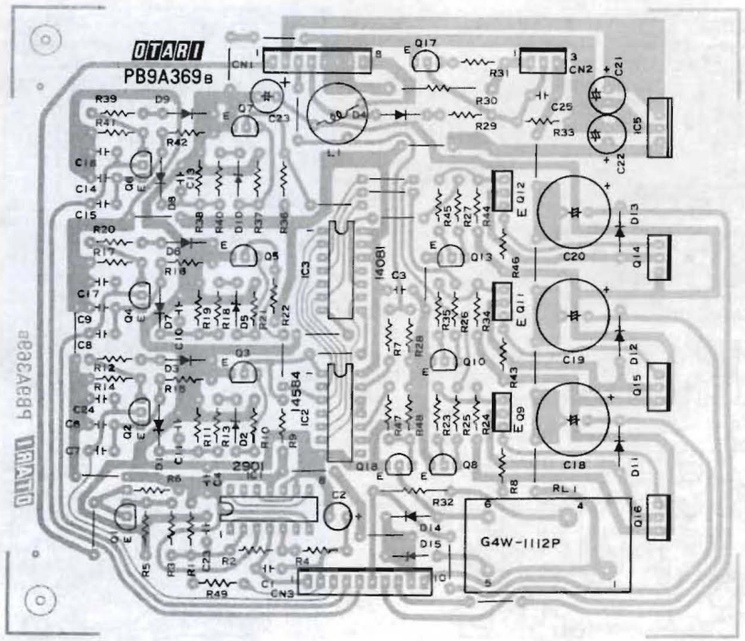


PARTS LIST 8 PB-45MA SPEED CALCULATOR P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A456B	-
IC6	IC	IJ390P	-
IC7	IC	IMSM966	-
IC8	IC	IMSM5502	-
IC10	IC	IMSM561	-
L1	Inductor	IN19069	47 µH
-	Connector	CN404053	(Nylon) 4P
-	Connector	CN406055	(Nylon) 6P
-	Connector	CN609121	(Socket) 9P
-	Connector	CN610122	(Socket) 10P



9. PB-45C CAPSTAN DRIVE P.C.B. ASSEMBLY

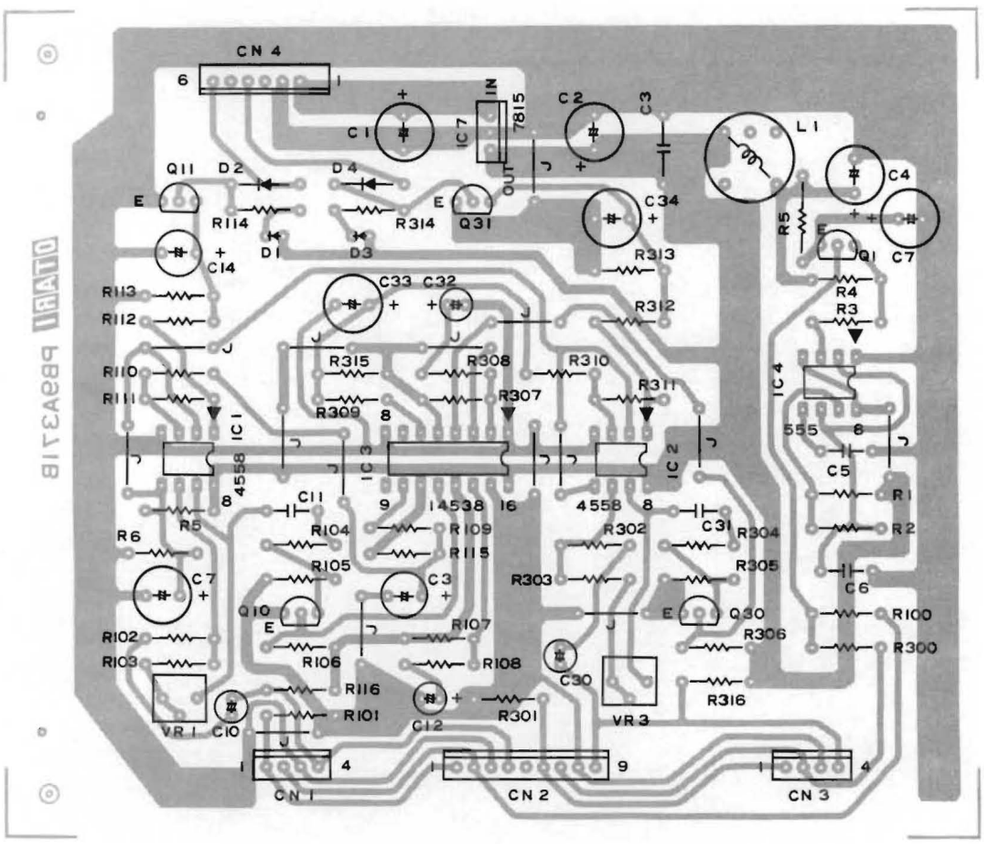


PARTS LIST 9 PB-45C CAPSTAN DRIVE P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A369B	-
IC5	IC	IHC78M15	-
D2, 5, 10	Diode	PNR3.6EB	-
D15	Diode	PNR2.7EB	-
L1	Inductor	IN19073	470 µH
-	Connector	CN403043	3P
-	Connector	CN408048	8P
-	Connector	CN410050	10P
R30	Resistor	R7CJR39M	2W 0.39Ω
RY1	Relay	RY1CA030	DC 12V
-	Spring	GS3010	-
-	Heatsink	PZ4B015	-
-	Holder, P.C.B.	T001026	-

PARTS LIST 10 PB-45D REEL SIZE DETECT P.C.B. ASSEMBLY

Ref. No.	Description	Parts No.	Notes
-	P.C.B.	PB9A371B	-
IC1, 2	IC	IHC4558C	-
IC7	IC	IHC78M15	-
L1	Inductor	IN19069	47 μH
VR1, 3	Potentiometer	RV454210	50 kΩ
-	Connector	CN404044	4P
-	Connector	CN406046	6P
-	Connector	CN409049	9P
-	Connector	CN608083	8P
-	Connector	CN616085	16P
-	Spring	GS3010	-
-	Holder, P.C.B.	T001026	-



13

SECTION 13

PARTS LISTS AND EXPLODED VIEW DRAWINGS

13.1 GENERAL

The following exploded view drawings and parts lists are provided for service reference. Parts list titles are followed by a key number which refers to the corresponding exploded view drawing number. For example, the parts list for the 2-track Head Assembly, Part List #1, is keyed to the first exploded view drawing. Notice that the reference number for the Head Mount Plate (P/N KH0C035), is related to part designation number 1 on that drawing.

When ordering parts, give a full description, using both the part number and the name of the part. If there seems to be a discrepancy between the drawings herein and your MTR-10 and MTR-12, contact Otari; we assume no liability for improper servicing due to changes and improvements which we may make that subsequently render certain of these documents obsolete. Most all of exploded view drawings are not prepared for the MTR-12. For the parts which differ from those for the MTR-10, please refer to the parts list in which you will find the proper information.

13.2 PARTS LISTS

The key numbers which precede the parts descriptions refer to callouts in the accompanying exploded view drawings. Each parts list is numbered and is associated with one exploded view drawing. As an example, the part listed below can be found in the first parts list and the first exploded view drawing.

PARTS LIST 1. HEAD ASSEMBLY 1/4": 2T, DIN, FT

Ref. No.	Description	Parts No.	Notes
1-1	Plate, Head Mount	KH0C040	

The exploded view drawings are numbered to correspond with the parts lists, and are indexed below for convenience. (A full set of schematic drawings is also included with each MTR-10 and MTR-12.)

1 Head Ass'y 1/4": 2T, DIN, FT
2 Head Ass'y Conversion type 1/4": 2T
3 Head Ass'y 1/2": 2CH
4 Head Ass'y 1/2": 4CH
5 Time Code Head Ass'y
6 Head Ass'y
7 Chassis Ass'y
8 Chassis Ass'y
9 Chassis Ass'y
10 Reel Ass'y
11 Audio Control Ass'y 2CH: Low Profile
12 Audio Control Ass'y 2CH: Overbridge
13 Audio Control Ass'y 4CH: Low Profile
14 Audio Control Ass'y 4CH: Overbridge
15 Amplifier Ass'y 2CH
16 Amplifier Ass'y 4CH
17 Power Supply Ass'y
18 Case Ass'y: Low Profile MTR-10
19 Case Ass'y: Overbridge MTR-10
20 Case Ass'y: Low Profile MTR-12
21 Case Ass'y: Overbridge MTR-12
22 Auto Locator Ass'y
23 Remote Control Box Ass'y

PARTS LIST 1. HEAD ASSEMBLY 1/4": 2T, DIN, FT

Ref. No.	Description	Parts No.	Notes
1	Plate Head Mount	KH0C040	
2	Bracket L	KH4X001	
3	Bracket R	KH4X002	
4	Head P.C.B. Ass'y	PB-75T	2T, DIN
		PB-78D	FT
5	Scrape Filter Ass'y	GR-6I	
6	Erase Head Ass'y		

	Ass'y	Head Unit	Head Plate	Screw
2T	GH4E004E	GH4E004	KH0D062	
DIN	GH4E082A	GH4E082	KH0D062	F14208BN
FT	GH4E012D	GH4E012	KH0D079	F14205BN

7	Spring GS2016
8	Record Head Ass'y

	Ass'y	Head Unit	Shield Case	Flat Washer
2T	GH4R132B	GH4R132	KH0B034	Not used
DIN	GH4R134A	GH4R134	"	"
FT	GH4R136A	GH4R136	Not used	F520-2BN

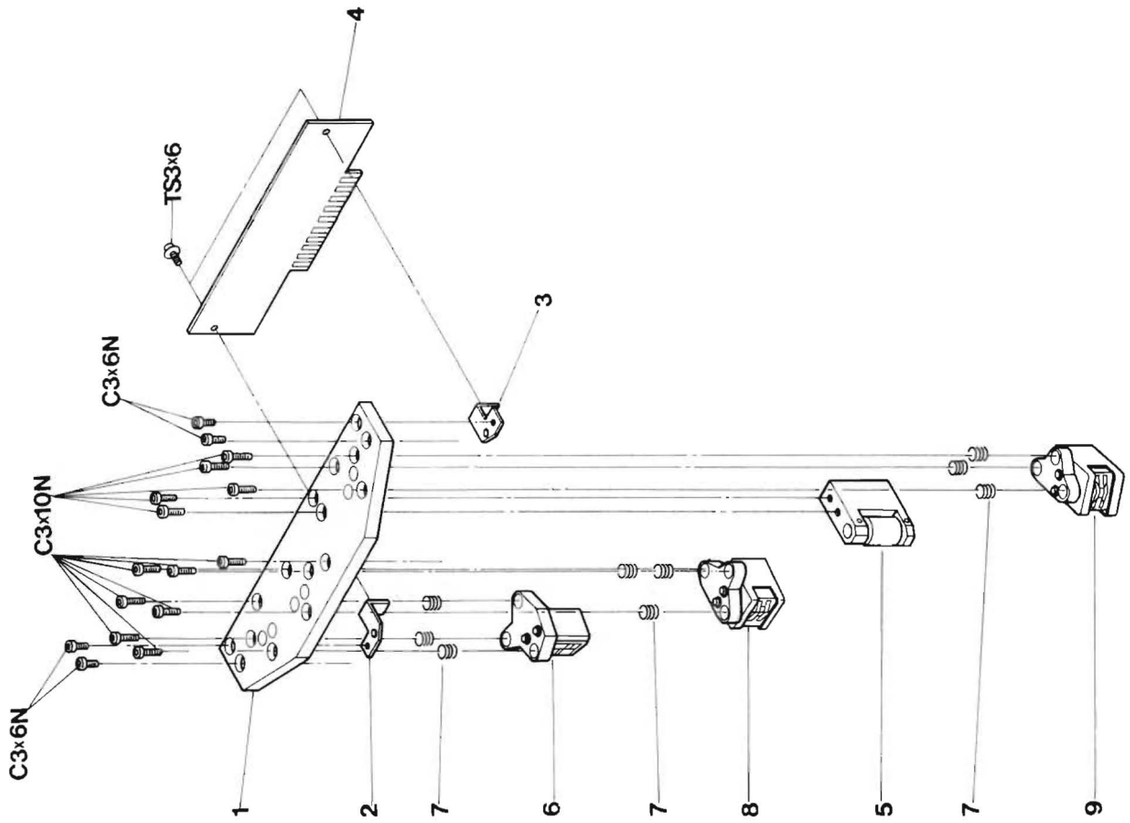
Screw	F14208BN
Head Plate	KH0D063
Spring Washer	F530-2BN

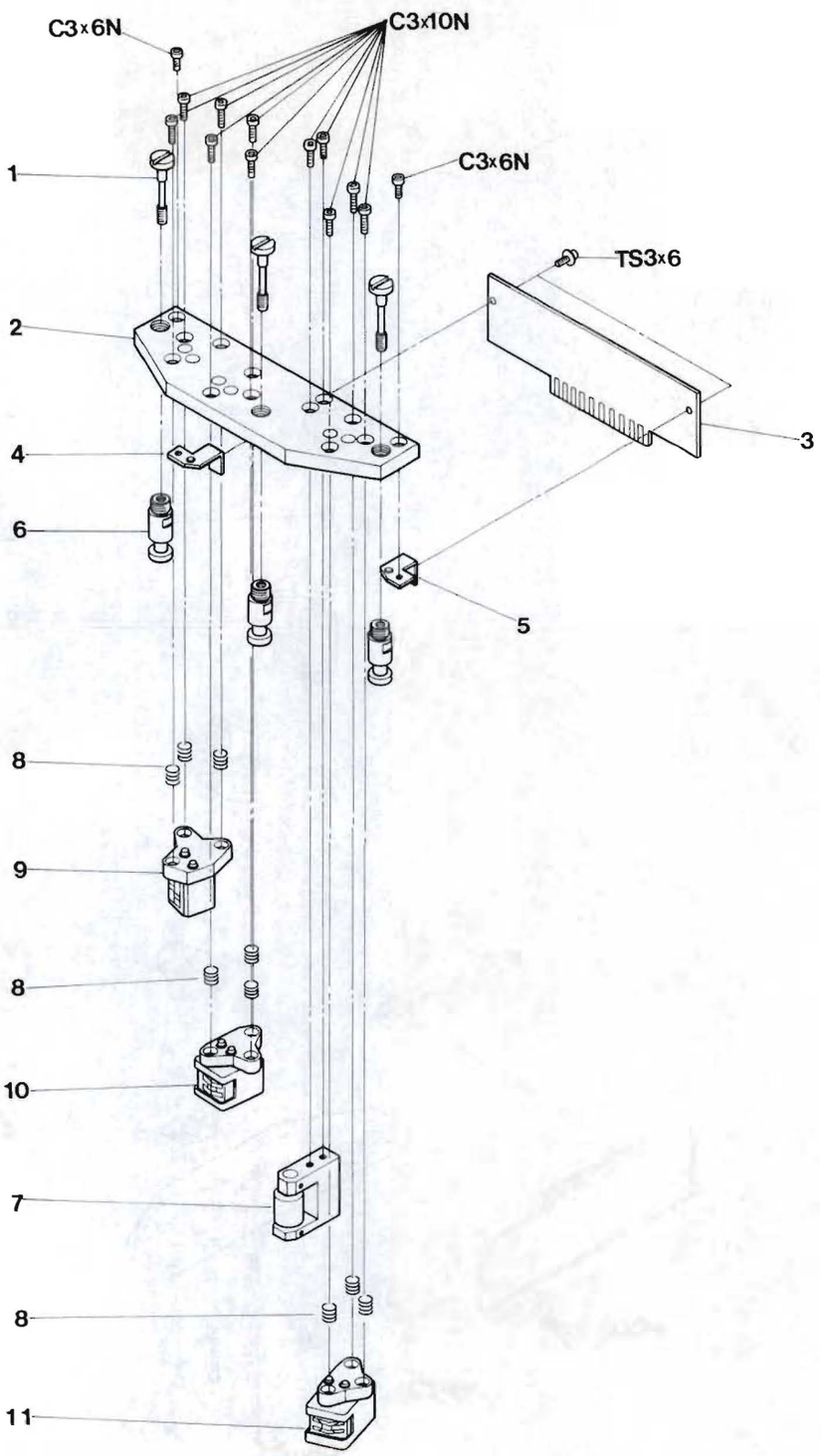
for 3 types above

9 Reproduce Head Ass'y

	Ass'y	Head Unit	Shield Case	Screw	Spring Washer	Head Plate
2T	GH4P133A	GH4P133	KH0B034	F14208BN	F530-2BN	KH0D063
DIN	GH4P135A	GH4P135	"	"	"	"
FT	GH4P137B	GH4P137	"	"	"	KH0D064

1. HEAD ASSEMBLY 1/4": 2T, DIN, FT




C3x6N
C3x10N
C3x6N
TS3x6
1
2
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6
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7
8
11

PARTS LIST 2. HEAD ASSEMBLY CONVERSION TYPE 1/4": 2T

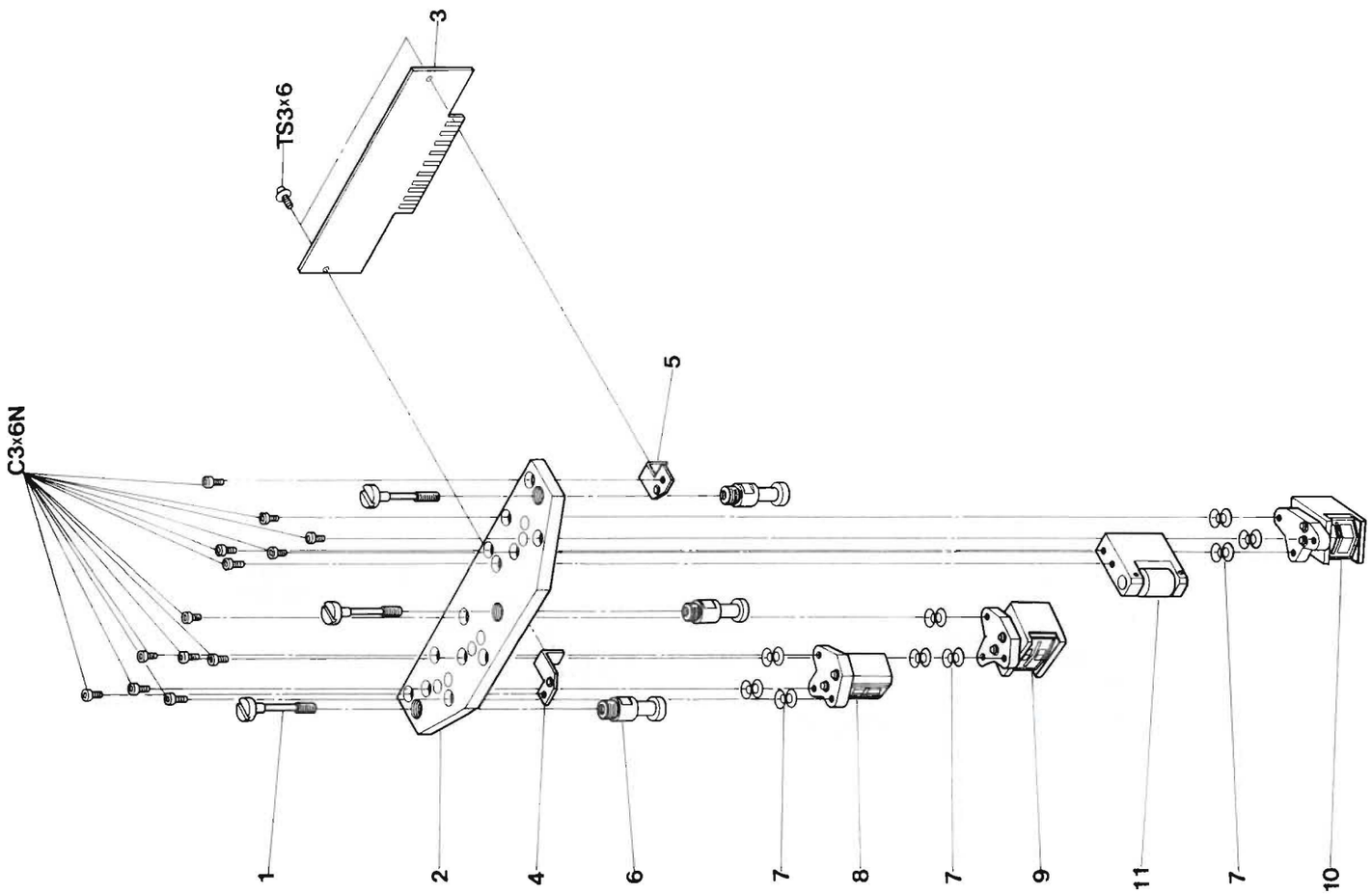
Ref. No.	Description	Parts No.	Notes
2- 1	Screw, Head	KZ6A071	
2	Plate, Head, Mount Base	KH0C042	
3	P.C.B. Ass'y, Head	PB-76S	
4	Bracket, L, P.C.B.	KH4X001	
5	Bracket, R, P.C.B.	KH4X002	
6	Guide, Head	KG0A022A	
7	Roller Ass'y, Scrape Filter	GR-6I	
8	Spring, Head 6mm	GS2016	
9	Head, Erase, 2T/2CH	GH4E082A	
10	Head, Record, 2T/2CH	GH4R070B	
11	Head, Reproduce, 2T/2CH	GH4P071A	

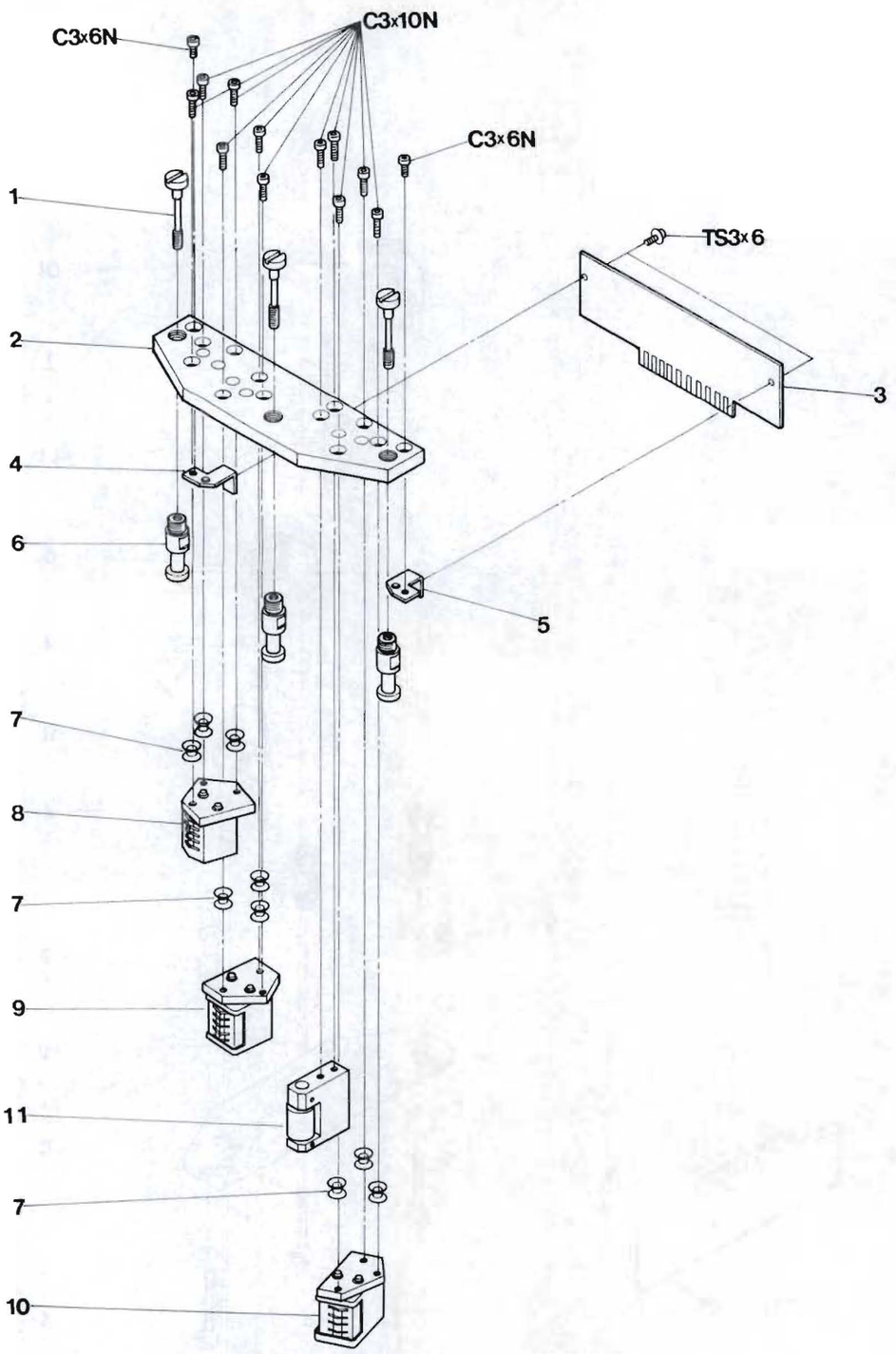
* Refer to PARTS LIST 1 for the Head Mounting parts.

PARTS LIST 3. HEAD ASSEMBLY 1/2": 2CH

Ref. No.	Description	Parts No.	Notes
3- 1	Screw, Head	KZ6A075	
2	Plate, Head, Mount Base	KH0C041	
3	P.C.B. Ass'y, Head	PB-75T	
4	Bracket, L, P.C.B.	KH4X001	
5	Bracket, R, P.C.B.	KH4X002	
6	Guide, Head	KG0A021A	
7	Spring, Coned Disc	PZ1E001	
8	Erase Head Ass'y	GH2E046A	
	Erase Head	GH2E046	
	Head Plate	KH0D092	
	Screw	F14C05BN	
	Spring Washer	F530-CBN	
9	Record Head Ass'y	GH2R066A	
	Record Head	GH2R066	
	Head Plate	KH0D091	
	Spring	F14C05BN	
	Spring Washer	F530-CBN	
10	Reproduce Head Ass'y	GH2P067A	
	Reproduce Head	GH2P067	
	Head Plate	KH0D091	
	Spring	F14C05BN	
	Spring Washer	F530-CBN	

3. HEAD ASSEMBLY 1/2": 2CH

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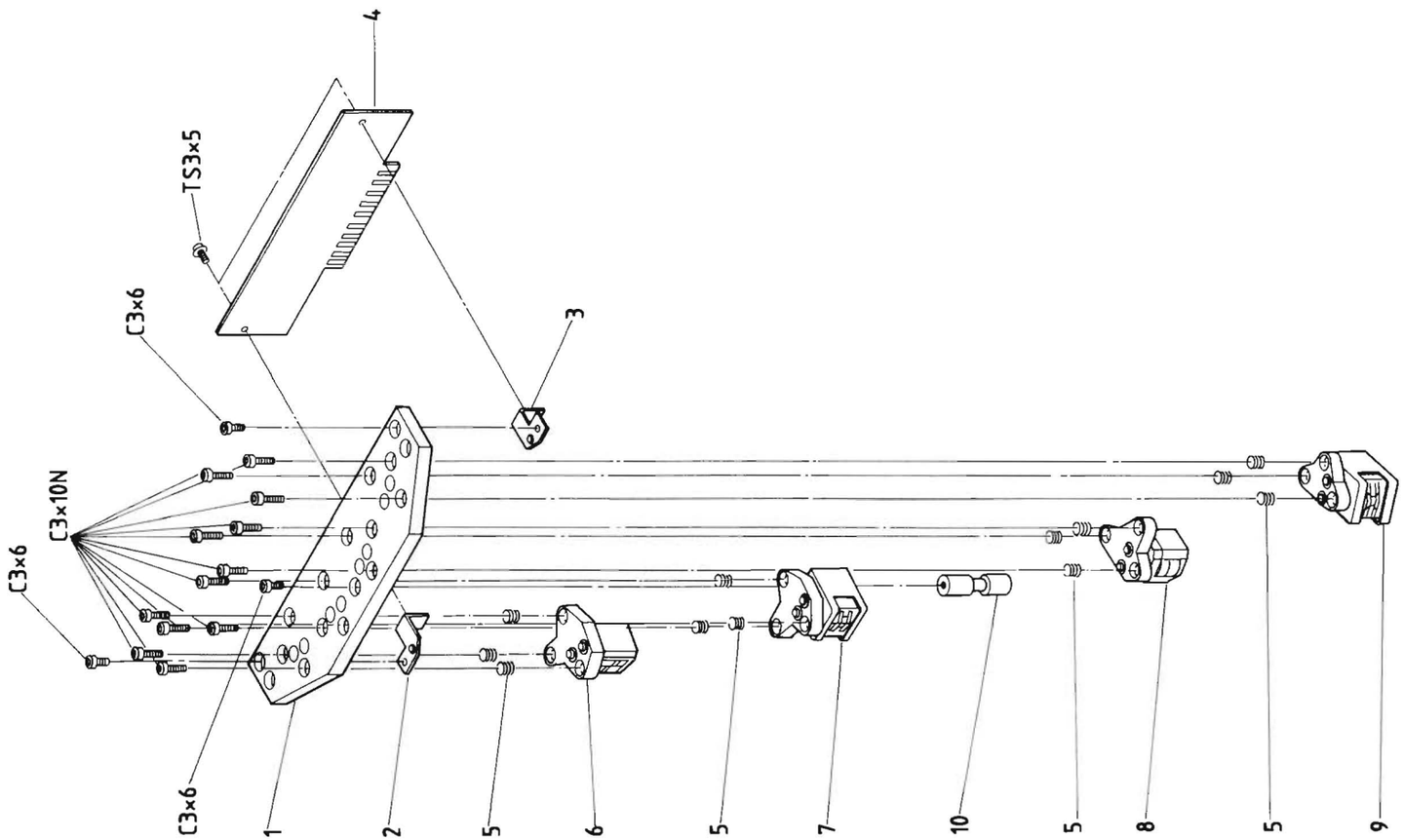
PARTS LIST 4. HEAD ASSEMBLY 1/2": 4CH

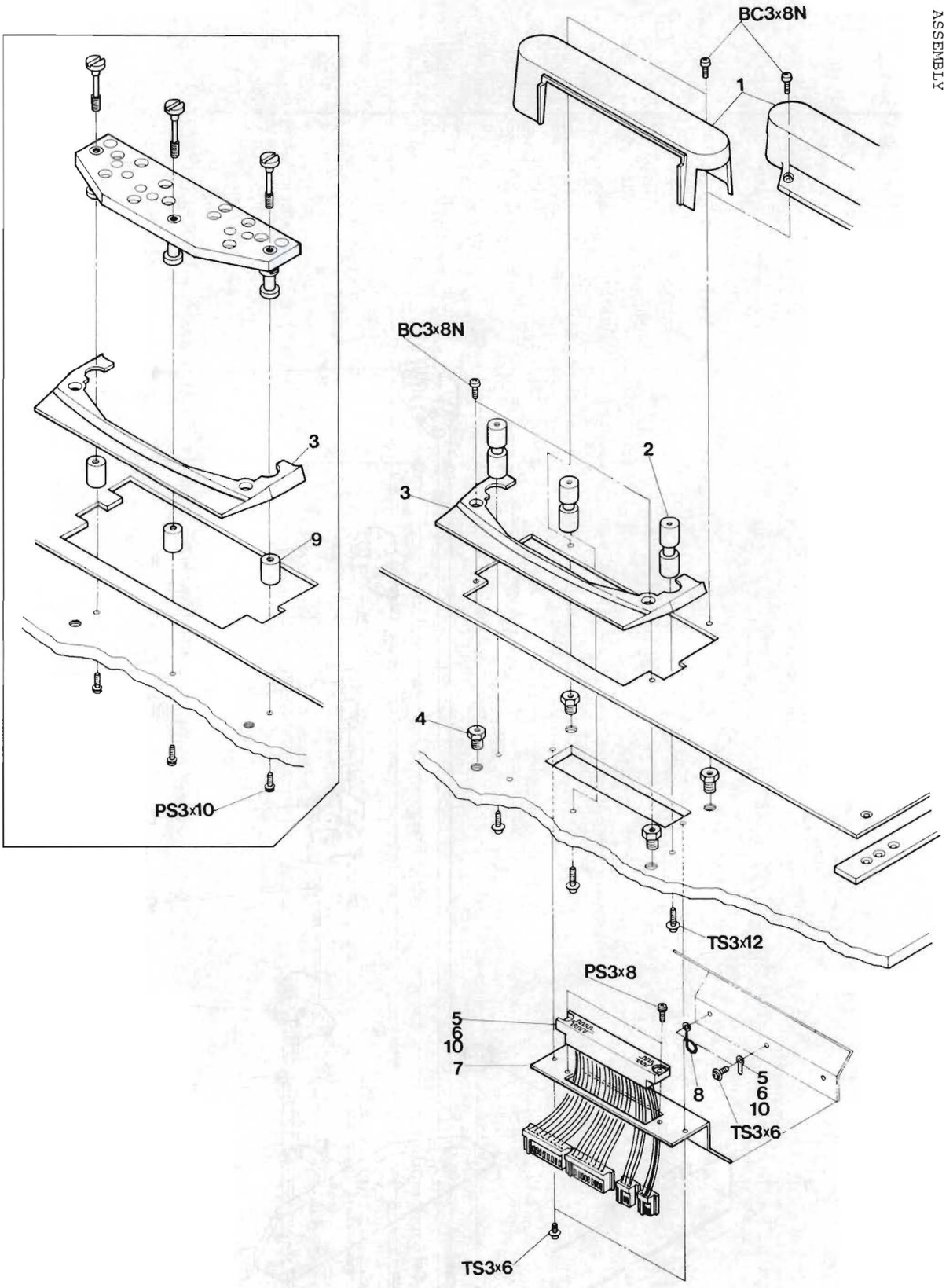
Ref. No.	Description	Parts No.	Notes
4- 1	Screw, Head	KZ6A075	
2	Plate, Head, Mount Base	KH0C041	
3	P.C.B. Ass'y, Head	PB-75U	
4	Bracket, L, P.C.B.	KH4X001	
5	Bracket, R, P.C.B.	KH4X002	
6	Guide, Head	KG0A021A	
7	Spring, Coned Disc	PZ1E001	
8	Erase Head Ass'y	GH2E047A	
	Erase Head	GH2E047	
	Head Plate	KH0D068A	
9	Record Head Ass'y	GH2R034A	
	Record Head	GH2R034	
	Head Plate	KH0D069	
	Shield Case	GH0A003	
10	Reproduce Head Ass'y	GH2P016B	
	Reproduce Head	GH2P016	
	Head Plate	KH0D069	
	Shield Case	GH0D069	
11	Roller Ass'y, Scrape Filter	GR-6I	

PARTS LIST 5. TIME CODE HEAD ASSEMBLY

Ref. No.	Description	Parts No.	Notes
5- 1	Plate Head Mount	KH0C052	
2	Bracket, L	KH4X001	
3	Bracket, R	KH4X002	
4	Head P.C.B. Ass'y	PB-7ANA	
5	Spring	GS2016	
6	Erase Head Ass'y	GH4E004E	
	Erase Head	GH4E004	
	Head Plate	KH0D062	
	Screw	F14208BN	
	Spring Washer	F530-2BN	
7	Record Head Ass'y	GH4R070A	
	Record Head	GH4R070	
	Head Plate	KH0D064	
	Shield Case	KH0B028	
	Screw	F14208BN	
	Spring Washer	F530-2BN	
8	Time Code Head Ass'y	GH4D101A	
	Time Code Head	GH4D102	
	Head Plate	KH0D063	
	Screw	F14208BN	
	Spring Washer	F530-2BN	
9	Reproduce Head Ass'y	GH4P071A	
	Reproduce Head	GH4P071	
	Head Plate	KH0D063	
	Shield Case	KH0B028	
	Screw	F14208BN	
	Spring Washer	F530-2BN	
10	Tape Guide	KG4B008	

5. TIME CODE HEAD ASSEMBLY

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TS3x6
TS3x6

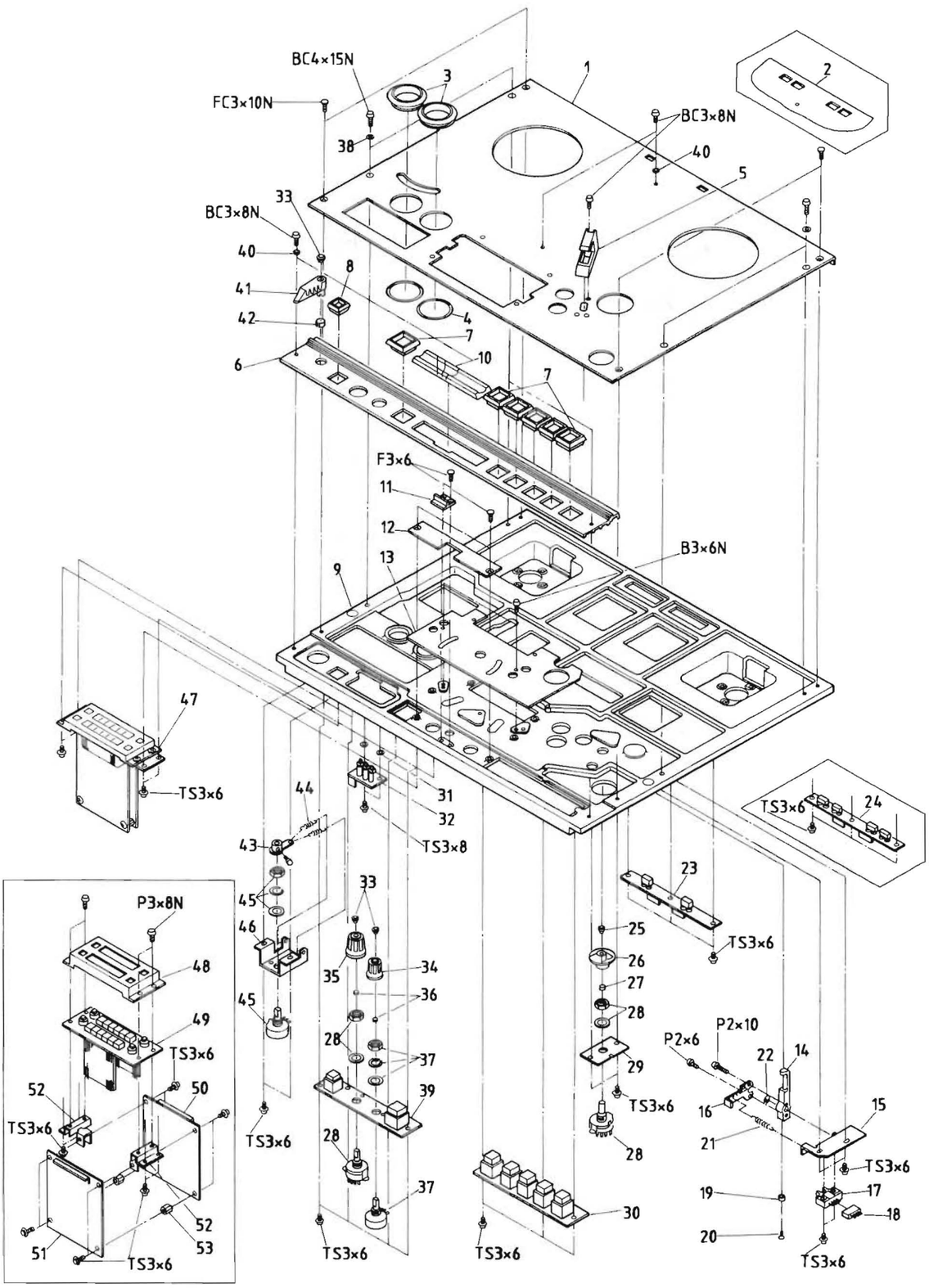
PARTS LIST 6. HEAD ASSEMBLY

Ref. No.	Description	Parts No.	Notes
6- 1	Head Housing	KH0F035	
2	Guide, Head	KG0D00C	
3	Skirt, Head	KH0F044	
4	Spacer, Trim, Panel	T001005	
5	Cable Ass'y, Head	ZA-62P	2CH
6	Cable Ass'y, Head	ZA-62V	4CH (2CH Conversion)
7	Bracket, Connector	KH4X003	
8	Clamp, Head Wire	PZ1G050	
9	Guide, Base, Head	KG0B018A	
10	Cable Ass'y, Head	ZA-63J	Full Track

PARTS LIST 7. CHASSIS ASSEMBLY

Ref. No.	Description	Parts No.	Notes
7- 1	Panel, Trim, Transport	T002104	MTR-10
2	Panel, Trim, Transport	T002501	MTR-12
3	Skirt, Ring, Roller	T001012	
4	Rubber, Sheet, Trim Panel	T001012	
5	Protector, Sensor Arm	T0010-I	
6	Panel, Trim, Control	T001017	
7	Protector, A, Button	PZ4A013	
8	Protector, B, Button	PZ4A014	
9	Panel, Chassis, Transport	T002101	
10	Block, Splice, Tape	T001010	
11	Stopper, Cutter	T001033	
12	Plate, Splice Block	T002103	
13	Plate, Shield	T002102	
14	Sensor Arm	T001018	
15	Bracket, Sensor Arm	T0021-E	
16	Plate, Sensor Arm	T002107	
17	Photo Sensor	PNEESG3M	
18	Connector, Photo Sensor	CN604073	
19	Weight	T001023	
20	Screw, Self Tapping	F33210SN	
21	Spring, Sensor Arm	GS1083	
22	Retaining Ring, E Type	F74TE15	
23	Photo Sensor, Reel Size Detector	PB-79KA	MTR-10
24	Photo Sensor, Reel Size Detector	PB-79LA	MTR-12
25	Cap, Knob	KN1058	
26	Knob, Speed Switch	KN1059	
27	Spacer, Switch Knob	KZ7A839	
28	Switch, Rotary	WH64037	
29	Bracket, Rotary Switch	T002108	
30	P.C.B. Ass'y, Control Switch	PB-75VB	
	Switch (Red)	WH1117R	
	" (Blue)	WH1117U	
	" (White)	WH1117W	
31	Stud, P.C.B.	KZ7A823	
32	P.C.B. Ass'y, Speed LED	PB-7ADA	
33	Cap, Knob	KN1048	
34	Knob, A, Pitch Control	KN1045	
35	Knob, B, Pitch Control	KN1046	
36	Spacer, Switch Knob	KZ7A838	
37	Potentiometer, Pitch Control	RV014026	
38	Washer, Trim Panel	KZ6C043	
39	P.C.B. Ass'y, Cue, Edit Switch	PB-77DB	
	Switch, White	WH11117W	
	Switch, White	WH11118W	
40	Washer, Trim Panel	KZ6C044	
41	Lever, Cue	KN3001	
42	Spring, Holding Lever	GS5018	
43	Plate, Spring Hook	T001029	
44	Spring, Cue Lever	GS1028	
45	Potentiometer, Cue	RV014027	
46	Bracket, Cue Potentiometer	T001027A	
47	Counter Ass'y	SR-5T	
48	Escutcheon, Timer	SR5J001	
49	P.C.B. Ass'y, Timer LED	PB-82G	
	Switch, Gray	WH11084C	
	Switch, Ivory	WH11084I	
	Switch, Yellow	HW11084Y	
50	P.C.B. Ass'y, SPD Calcu.	PB-45MA	
51	P.C.B. Ass'y, Timer Drive	PB-45B	
52	Bracket, P.C.B.	SR5T001	
53	Stud, P.C.B.	KZ7B802	

* Refer to Schematics for the parts number of the parts mounted on a P.C.B. Ass'y.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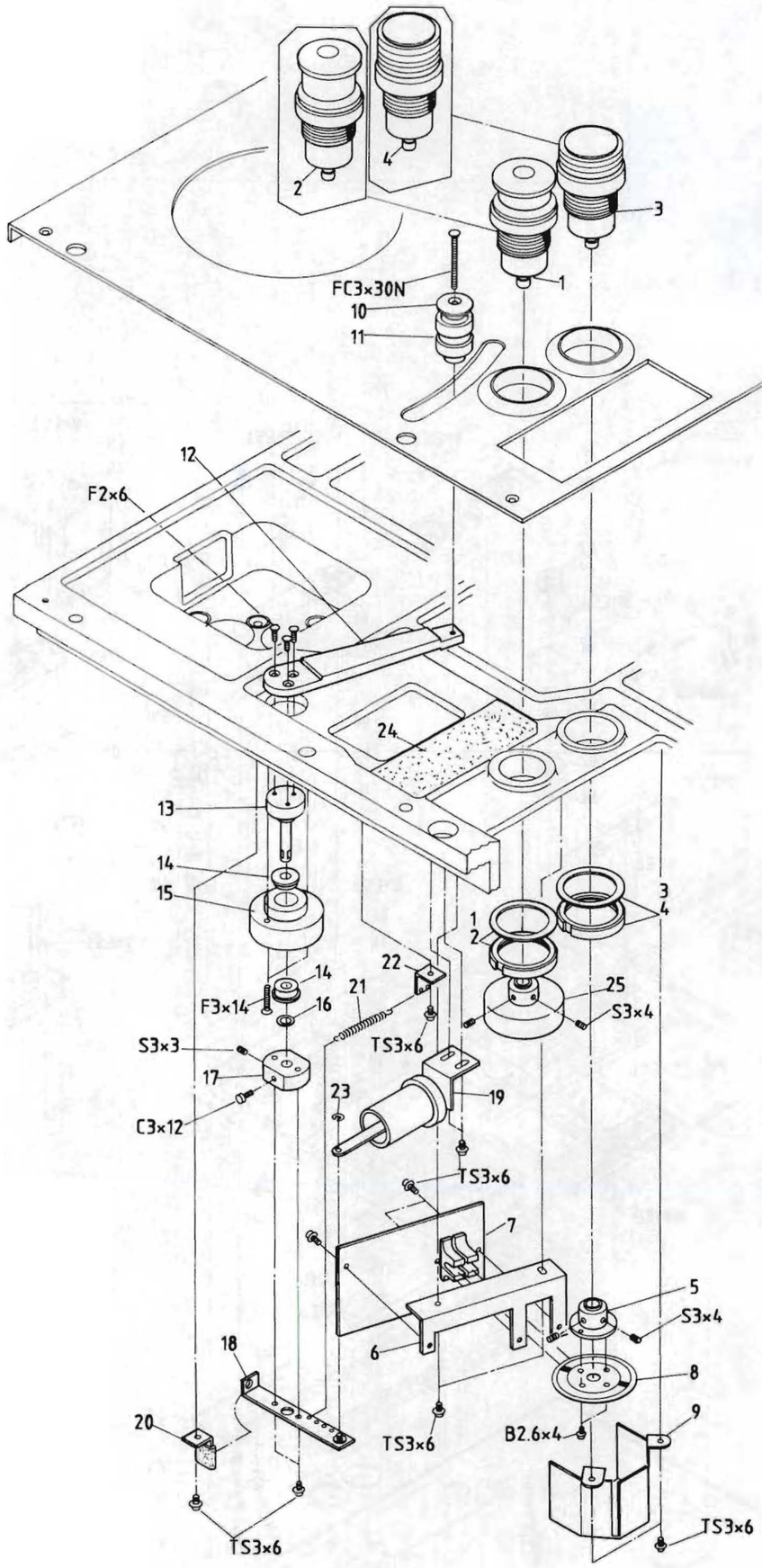
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TS3×6
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TS3×6
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S3×4
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TS3×6
B2.6×4
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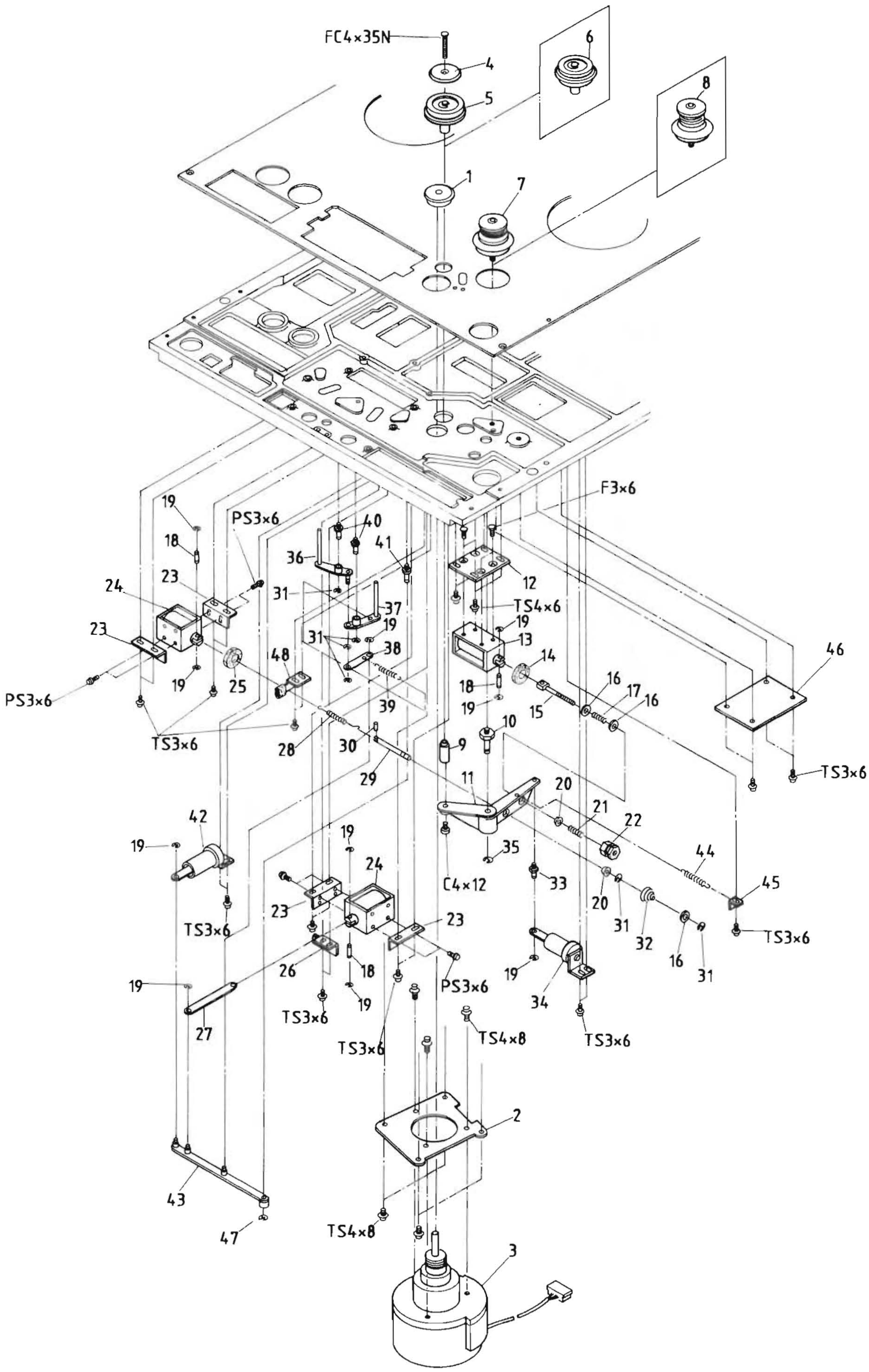
PARTS LIST 8. CHASSIS ASSEMBLY

Ref. No.	Description	Parts No.	Notes
8- 1	Roller Ass'y, 1/4"	GR-4W	
2	Roller Ass'y, 1/2"	GR-2P	
3	Impedance Roller Ass'y, 1/4"	KI-4K	
4	Impedance Roller Ass'y, 1/2"	KI-2G	
5	Boss, Roller	KI4F001A	
6	Bracket, P.C.B.	KI4K002	
7	P.C.B. Ass'y, Roller Tacho	PB-47TA	Photo Interruptor PN-0145
8	Encoder, Roller	SR3Z007	
9	Protector, Encoder	KI4K002	
10	Cap, Roller Ass'y	KA0C008	
11	Roller Ass'y, Tension Arm	KA-41AB	
12	Tension Arm	KA0A037	
13	Shaft, Arm	KA0A038	
14	Washer, Polyslider	BA21150W	
15	Holder, Tension Arm	KA0B017	
16	Washer, Polyslider	F524-5	
17	Drum, Retaining Arm Shaft	KA4E016	
18	Plate, Spring Hook	KA4T001	
19	Air Pot Ass'y	AS-72H	
20	Angle, Limit Stop	KA-41AA	
21	Spring, Tension Arm	GS1109	
22	Angle, Spring Hook	KZ2A099	
23	Retaining Ring, E Type	F74TE09	
24	Sheet, Blind	KZ41A03	
25	Flywheel	GR4P004A	

PARTS LIST 9. CHASSIS ASSEMBLY

Ref. No.	Description	Parts No.	Notes
9- 1	Cap, Dust, Capstan	KC4U001	
2	Plate, Capstan Motor	KC4H001	
3	Motor, Capstan	KC-4U-A	
4	Cap, Pinch Roller	KP0C019	
5	Pinch Roller, 1/2"	KP-4M-C	
6	Pinch Roller, 1/4"	KP-2G-B	
7	Roller, Guide, 1/4"	GR-4U	
8	Roller, Guide, 1/2"	GR-2N	
9	Shaft, Pinch Roller	KP4M005	
10	Shaft, Roller Arm	KP0B044	
11	Arm, Pinch Roller	KP0B040	
12	Plate, Solenoid	KP0E023	
13	Solenoid, Pinch Roller	GP1B06	
14	Cushion, Pinch Solenoid	PZ1C046	
15	Rod, Solenoid	KZ6A066	
16	Washer, Solenoid Rod	KZ6C006	
17	Spring, Pressure, Rod	GS2068	
18	Pin, Solenoid	KZ5A003	
19	Retaining Ring, E Type	F74TE09	
20	Washer, Spherical, Rod	KP0G004	
21	Spring, Pressure, Rod	GS2088	
22	Nuts, M4, Rod	F517-4	
23	Plate, Solenoid	KP0E022	
24	Solenoid	GP1F02	
25	Cushion, Pinch Solenoid	PZ1C022	
26	Limit Stop, Lifter Solenoid	KR-4N-A	
27	Plate, Lifter Solenoid	KR4J012	
28	Spring, Solenoid	GS1078	
29	Rod, Solenoid	KP4M002	
30	Pin, Solenoid Rod	62B05	
31	Retaining Ring, E Type	F74TE15	
32	Spring, Solenoid	GS2069	
33	Shaft, Connect. Arm	KZ5G010	
34	Air Pot Ass'y	AS-71N	
35	Retaining Ring, E Type	F74TE22	
36	Arm, Lifter, A	KR4J001	
37	Arm, Lifter, B	KR4J004	
38	Plate, Lifter Arm	KR4J011	
39	Spring, Lifter Arm	GS1081	
40	Shaft, Lifter Arm	KR4B001	
41	Shaft, Connect. Arm	KR4J006	
42	Air Pot Ass'y	AS-72G	
43	Arm, Connect	KR4J007	
44	Spring, Pressure, Rod	GS1077	
45	Nuts, M4, Rod	F517-4	
46	P.C.B. Ass'y, Connect. Wire	PB-7AEA	
47	Retaining Ring, E Type	F74TE20	
48	Limit Stop, Solenoid	KP-4P-A	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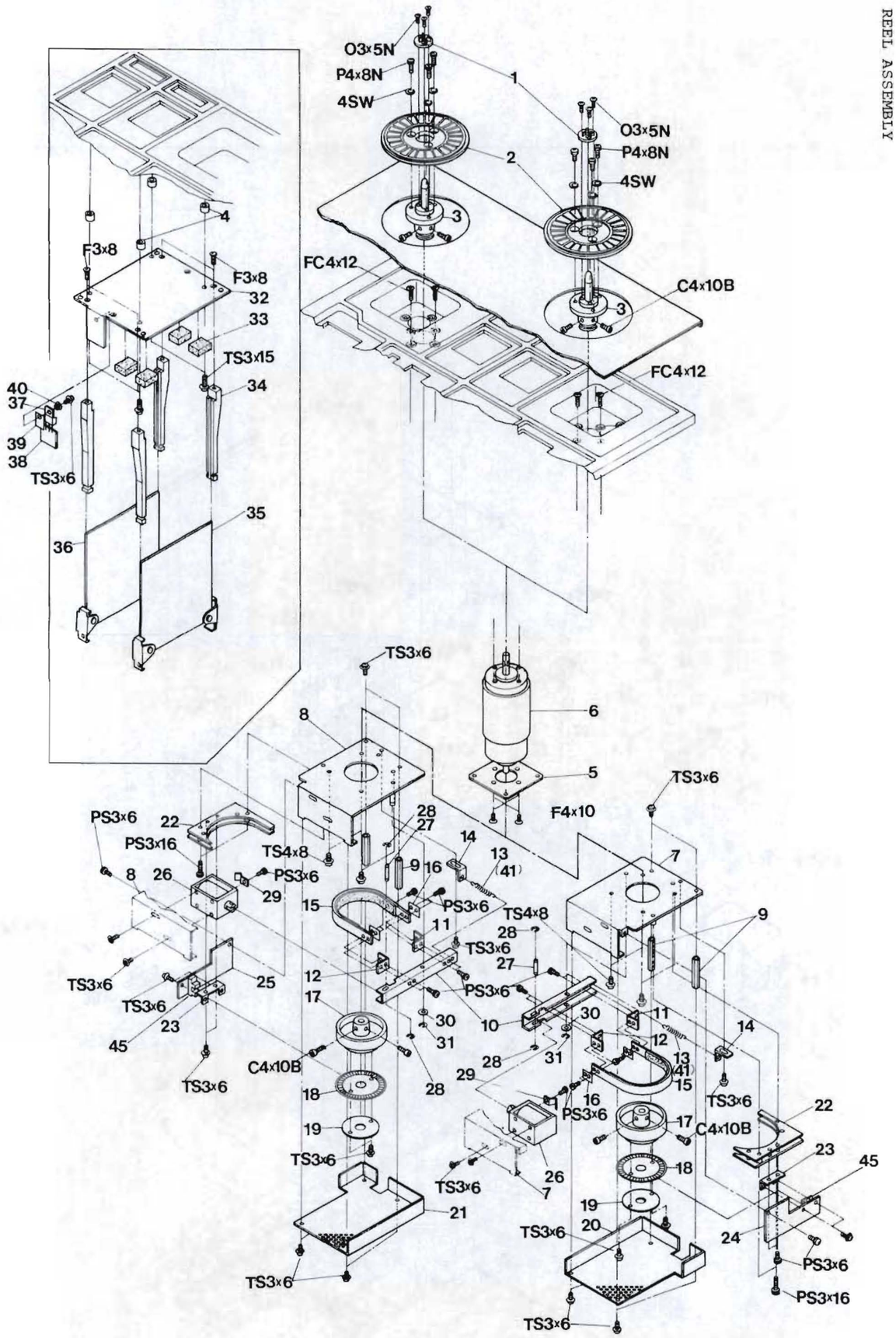
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PS3x16
TS4x8

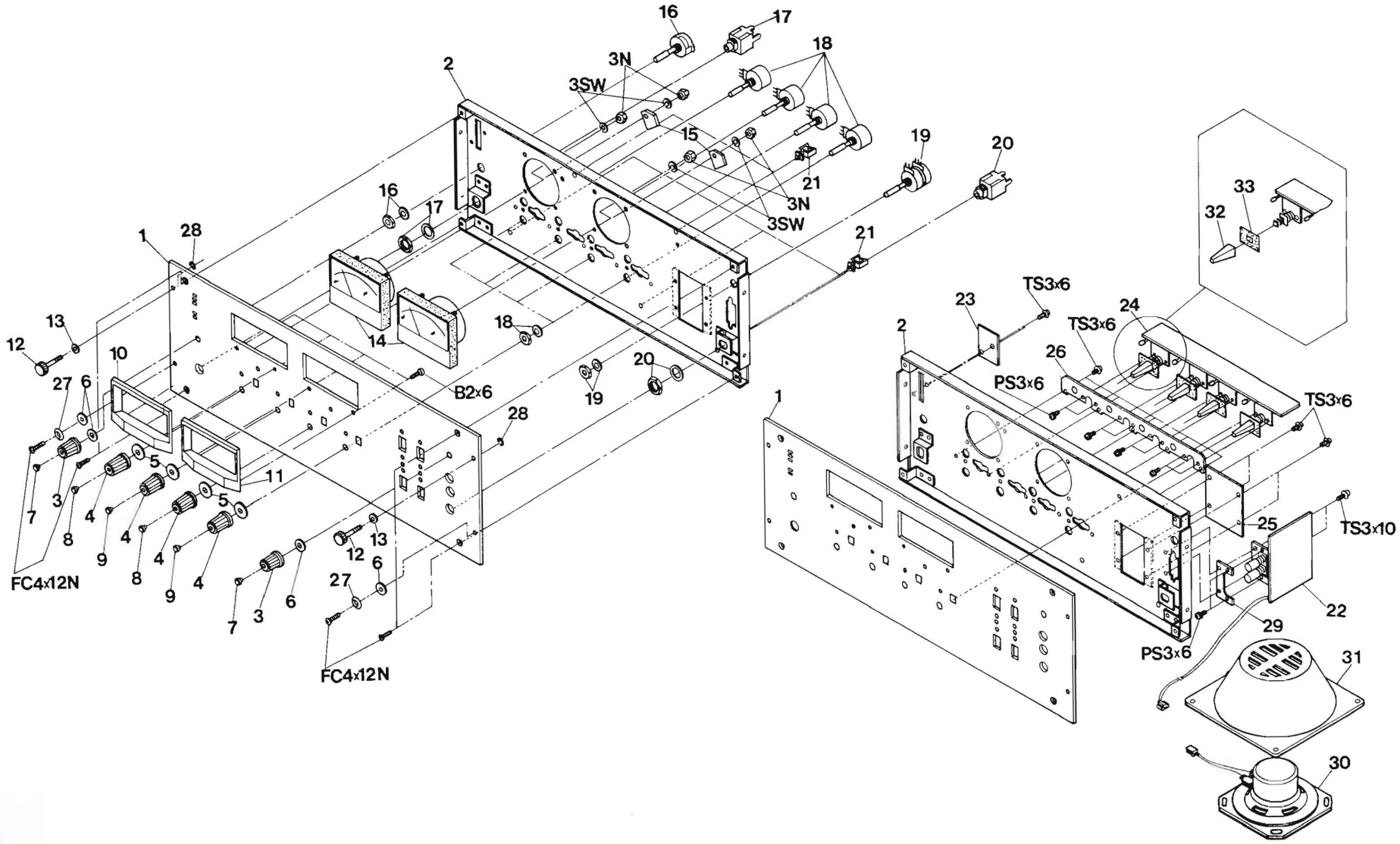
PARTS LIST 10. REEL ASSEMBLY

Ref. No.	Description	Parts No.	Notes
10- 1	Reel Drive Nail	KW0E038	
2	Reel Drive Nail	KW4P024	
3	Holder Reel	KW0B017	
4	Stud	KZ9C100B	
5	Plate, Spacer, Motor	KW4U001	
6	Motor, Reel	MR5A033S	with Connector MTR-10 series
	Motor, Reel	MR5A034S	with Connector MTR-12 series
7	Plate, R, Reel Motor	KW4P002	
8	Plate, L, Reel Motor	KW4P001	
9	Stud, Brake Plate	KZ7B803	
10	Arm, Brake	KW4P009	
11	Angle, B, Brake	KW4P013	
12	Angle, A, Brake	KW4P012	
13	Spring, Brake	GS1091	
14	Angle, Spring Hook	KW4P014	
15	Band, Brake	KW-4P-B	
16	Plate, Brake	KZ2A086	
17	Drum, Brake	KW4P021	
18	Encoder, Reel	SR3D004	
19	Plate, Encoder	KW4P022	
20	Protector, R, Brake	KW4P008	
21	Protector, L, Brake	KW4P007	
22	Retainer, Brake	KW4P016	
23	Bracket, P.C.B.	KW4P020	
24	P.C.B., R, Reel Tacho	PB-44Z	
25	P.C.B., L, Reel Tacho	PB-44Y	
26	Solenoid, Brake	GP1F02	
27	Pin, Brake	KW4P015	
28	Retaining Ring, E Type	F74TE09	
29	Guide, Brake	KZ3A047	
30	Washer, Polyslider	F724-5	
31	Retaining Ring, E Type	F74TE20	
32	Plate, P.C.B. Ass'y	T002109	
33	Cushion, P.C.B. Ass'y	PZ1C047	
34	Guide, Rail	CN7B-020	
35	P.C.B., Capstan Drive	PB-45CB	
36	P.C.B., Reel Size Detector	PB-45DB	
37	Transistor	QD6340	
38	P.C.B., Transistor	PB9A385	
39	Sheet, Transistor Insulation	PZ4B054	
40	Washer, Transistor Insulation	PZ4B036	
41	Photo Interruptor	PN-0145	

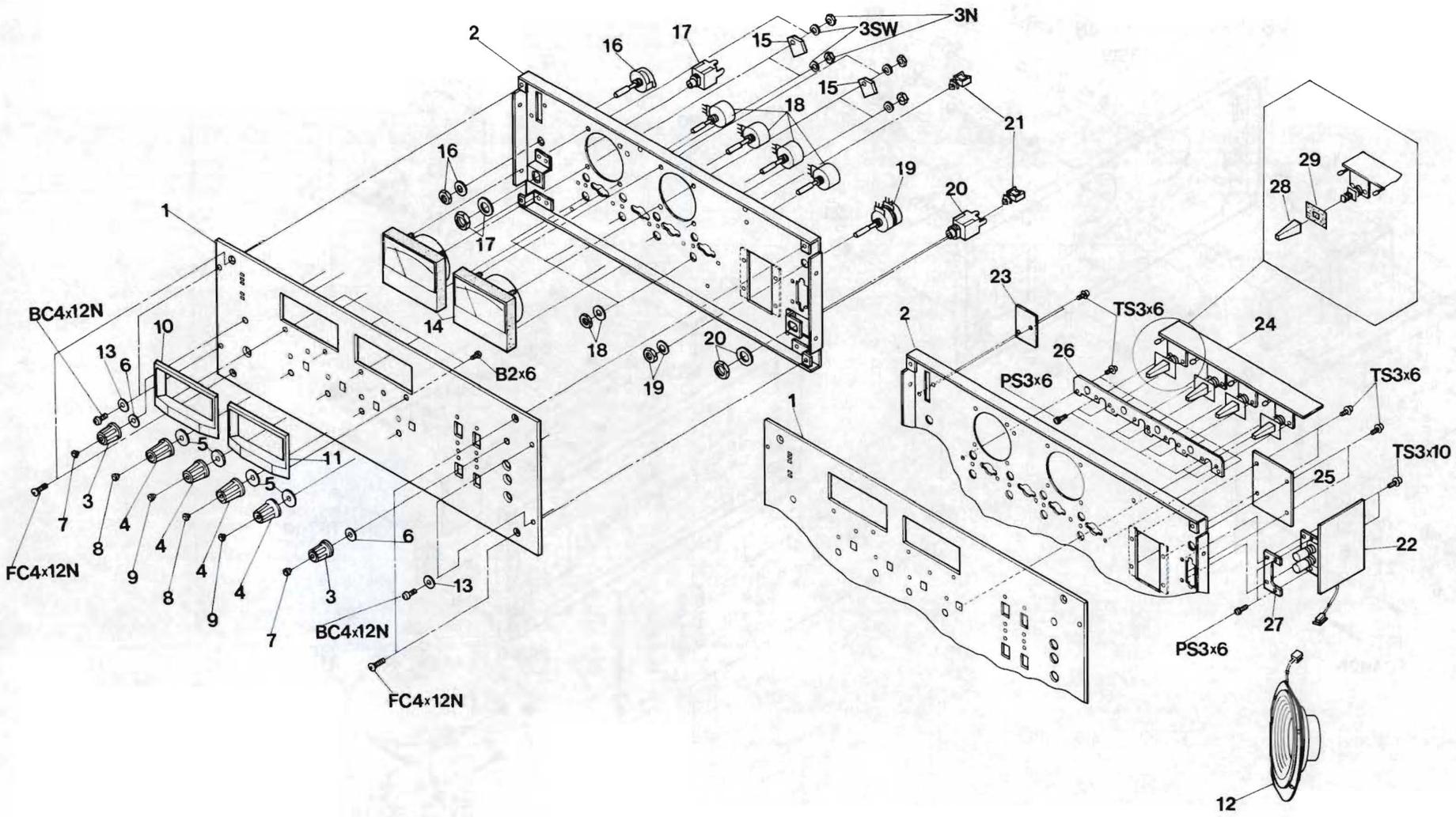
PARTS LIST 11. AUDIO CONTROL ASSEMBLY 2CH: LOW PROFILE

Ref. No.	Description	Parts No.	Notes
11- 1	Panel, Trim, Control	CB23301	
2	Panel, Chassis, Control	CB23302	
3	Knob, A, Control	KN1045	
4	Knob, B, Control	KN1046	
5	Washer, Knob, Control	KZ6C047	
6	Washer, Knob, Control	KZ6C048	
7	Cap, Knob, Control, Yellow	KN1052	
8	Cap, Knob, Control, Orange	KN1053	
9	Cap, Knob, Control, Blue	KN1050	
10	Escutcheon, CH 1, Meter	CB23308	
11	Escutcheon, CH 2, Meter	CB23309	
12	Screw, Trim, Control	CB23307	
13	Washer, Screw, Control	KZ6C046	
14	Meter, VU	ME11005	
	Meter Lamp	LU2049	
15	P.C.B. Ass'y, LED (C), Peak	PB-81J	
16	Switch, Rotary, Test OSC	WH61038	
17	Jack, Ext. Osc.	CN601142	
18	Potentiometer, Control, Single	RV214080	
19	Potentiometer, Control, Double	RV214081	
20	Jack, Phones	CN602143	
21	Clamp, Wire, Control	PZ1G029	
22	P.C.B. Ass'y, H.P. Amplifier	PB-14YA	
	Switch	WH12119	
23	P.C.B. Ass'y, LED (H)	PB-82H	
24	P.C.B. Ass'y, SRL Switch	PB-76BA	
	Switch	WH12023	
25	P.C.B. Ass'y, Control Switch	PB-75Z	
26	Bracket, P.C.B. Ass'y	CB23313	
27	Washer, Trim, Control	KZ6C049	
28	Retaining Ring, E Type ø3	F74TE15	
29	Bracket, P.C.B. Ass'y	CB23312	
30	Speaker	SF1004	
31	Cover, Speaker	PZ9C004	
32	Button, SRL Switch	KN2067	
33	Felt, SRL Switch	PZ1B012	

11. AUDIO CONTROL ASSEMBLY 2CH: LOW PROFILE



12. AUDIO CONTROL ASSEMBLY 2CH: OVERBRIDGE



PARTS LIST 12. AUDIO CONTROL ASSEMBLY 2CH: OVERBRIDGE

Ref. No.	Description	Parts No.	Notes
12- 1	Panel, Trim, Control	CB23301	
2	Panel, Chassis, Control	CB23302	
3	Knob, A, Control	KN1045	
4	Knob, B, Control	KN1046	
5	Washer, Knob, Control	KZ6C047	
6	Washer, Knob, Control	KZ6C048	
7	Cap, Knob, Control, Yellow	KN1052	
8	Cap, Knob, Control, Orange	KN1053	
9	Cap, Knob, Control, Blue	KN1050	
10	Escutcheon, CH 1, Meter	CB23308	
11	Escutcheon, CH 2, Meter	CB23309	
12	Speaker	SF1004	
13	Washer, Screw, Control	KZ6C043	
14	Meter, VU	ME11005	
	Meter Lamp	LU2049	
15	P.C.B. Ass'y, LED (C), Peak	PB-81J	
16	Switch, Rotary, Test OSC.	WH61038	
17	Jack, Ext. OSC.	CN601142	
18	Potentiometer, Control, Single	RV214080	
19	Potentiometer, Control, Double	RV214081	
20	Jack, Phones	CN602143	
21	Clamp, Wire, Control	PZ1G029	
22	P.C.B. Ass'y, H.P. Amplifier	PB-14YA	
	Switch	WH12119	
23	P.C.B. Ass'y, LED (H)	PB-82H	
24	P.C.B. Ass'y, SRL Switch	PB-76BA	
	Switch	WH12023	
25	P.C.B. Ass'y, Control Switch	PB-75Z	
26	Bracket, P.C.B. Ass'y	CB23313	
27	Bracket, P.C.B. Ass'y	CB23312	
28	Button, SRL Switch	KN2067	
29	Felt, SRL Switch	PZ1B012	

PARTS LIST 13. AUDIO CONTROL ASSEMBLY 4CH: LOW PROFILE

Ref. No.	Description	Parts No.	Notes
13- 1	Panel, Trim, Control	CB23901	
2	Panel, Chassis, Control	CB23902	
3	Knob, A, Control	KN1045	
4	Knob, B, Control	KN1046	
5	Washer, Knob, Control	KZ6C047	
6	Washer, Knob, Control	KZ6C048	
7	Cap, Knob, Control, Yellow	KN1052	
8	Cap, Knob, Control, Orange	KN1053	
9	Cap, Knob, Control, Blue	KN1050	
10	Escutcheon, CH 1, Meter	CB23308	
11	Escutcheon, CH 2, Meter	CB23309	
12	Escutcheon, CH 3, Meter	CB23310	
13	Escutcheon, CH 4, Meter	CB23311	
14	Meter, VU	ME11005	
	Meter Lamp	LU2049	
15	P.C.B. Ass'y, LED (C), Peak	PB-81J	
16	Clamp, Wire, Control	PZ1G029	
17	P.C.B. Ass'y, LED (H)	PB-82H	
18	Jack, Ext. Osc.	CN601142	
19	P.C.B. Ass'y, H.P. Amplifier	PB-150	
20	P.C.B. Ass'y, Control Switch	PB-76A	
	Switch	WH12112	
21	Switch, Rotary	WH51038	
22	Potentiometer, Control	PV214080	
23	Jack, Phones	CN602143	
24	P.C.B. Ass'y, SRL Switch	PB-76BA	
	Switch	WH12023	
25	P.C.B. Ass'y, SRL Switch	PB-76BAA	
	Switch	WH12023	
26	Screw, Trim, Control	CB23307	
27	Washer, Screw, Control	KZ6C046	
28	Washer, Trim, Control	KZ6C049	
29	Retaining Ring, E Type ø3	F74TE15	
30	Bracket, P.C.B. Ass'y	CB23313	
31	Bracket, P.C.B. Ass'y	CB23906A	
32	Speaker	SF1004	
33	Cover, Speaker	PZ9C044	
34	Button, SRL Switch	KN2067	
35	Felt, SRL Switch	PZ1B012	

TABLE 13-1. VARIATIONS OF THE MTR-10 AMPLIFIER & CONTROL P.C.B. ASSEMBLY

Ref. No.	MODEL (MTR-) / ASS'Y NAME	10(12)-2 10(12)-C 10(12)-K 10(12)-M 10(12)-2T 10(12)-CT	10(12)-4 10(12)-I	10(12)-G 10(12)-H	10-2L 10-CL 10-KL 10-ML	10-4L 10-IL	12-4 12-I 12-2
-29	AUDIO AMPLIFIER	(Refer to Table 13-2.)					
-30	AUDIO CONTROL	PB-44XA	←	←	PB-44XAA	←	←
-31	CAPSTAN CONTROL	PB-44WA	←	←	PB-44WAA	←	←
-32	REEL CONTROL	PB-44VA	←	←	PB-44VAA	←	PB-46VA
-33	MASTER CPU	PB-4GEA	←	←	←	←	←
-34	TRANSPORT CONTROL	PB-44TA	←	←	←	←	←

TABLE 13-2. AUDIO AMPLIFIERS

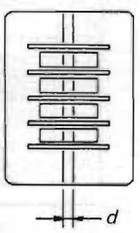
	High speed version				Low speed version		
ASSY No.	PB-14XAE	PB-14XAC	PB-14XAF	PB-14XAH	PB-14XBB	PB-14XB	PB-14XBC
USE / REF.NO.	MTR-10-2, C,K,M,2U, 2T,CT	MTR-10-4*, I*, IAB*	MTR-10-A, B	MTR-10-G, H	MTR-10-2L,CL,KL, ML,2UL, CLAB	MTR-10-4L*,IL*	MTR-10-AL,BL
R1	150k	150k	150k	150k	150k	150k	150k
R2	100k	100k	100k	100k	100k	100k	100k
R35	open	2.2M	open	open	open	open	open
R36	1.2M	390k	1.2M	1.2M	open	390k	open
R37	open	1.5M	open	open	open	2.2M	open
R39	short	short	short	short	2.0k	2.0k	2.0k
R40	1.5k	680	1.5k	680	2.4k	2.4k	2.4k
R41	2.0k	2.0k	2.0k	2.0k	3.3k	3.3k	3.3k
R42	2.4k	2.4k	2.4k	2.4k	4.3k	4.3k	4.3k
R43	3.3k	3.3k	3.3k	3.3k	short	short	short
R44	4.3k	4.3k	4.3k	4.3k	7.5k	7.5k	7.5k
R160	33k	33k	33k	33k	15k	15k	15k
R165	open	open	open	open	6.8k	6.8k	6.8k
R167	15k	15k	15k	15k	10k	10k	10k
R168	6.8k	6.8k	6.8k	6.8k	11k	11k	11k
R169	47k	47k	47k	47k	43k	43k	43k
R172	6.8k	6.8k	6.8k	6.8k	2.7k	2.7k	2.7k
R179	2.7k	2.7k	2.7k	2.7k	1.5k	1.5k	1.5k
R198	1k	1k	680	680	1k	1k	1k
R215	220(1W)	220(1W)	100(2W)	220(1W)	220(1W)	220(1W)	100(2W)
*R240	180(2W)	180(2W)* or 270(2W)	100(2W)	100(2W)	180(2W)	180(2W)* or 270(2W)	100(2W)
C2	47p	47p	open	47p	47p	47p	open
C75	100p	100p	100p	120p	120p	120p	120p
C76	open	open	open	open	330p	680p	330p
C77	0.0068u	0.0068u	0.0068u	0.0068u	0.01u	0.01u	0.01u
C78	120p	120p	120p	120p	180p	180p	180p
C79	330p	680p	330p	680p	680p	0.0015u	680p
C80	0.01u	0.01u	0.01u	open	0.01u	0.022u	0.01u
C81	180p	180p	180p	180p	180p	470p	180p
C82	680p	0.0015u	680p	0.0015u	0.0015u	0.0022u	0.0015u
C92	0.0012u /630v	0.0012u /630v	680p /630v	0.0012u /630v	0.0012u /630v	0.0012u /630v	680p /630v
C94	0.0012u /630v	0.0012u /630v	0.0018u /630v	0.0022u /630v	0.0012u /630v	0.0012u /630v	0.0018u /630v
C99	0.1u	0.1u	0.1u	0.1u	0.1u	0.1u	0.1u
VR3	2k(B)	2k(B)	2k(B)	2k(B)	5k(B)	5k(B)	5k(B)
VR5	5k(B)	5k(B)	5k(B)	5k(B)	10k(B)	10k(B)	10k(B)
J1	H	H	H	H	L	L	L
J2	H	H	H	H	L	L	L
J3	H	H	H	H	L	L	L
J4	H	H	H	H	L	L	L
T1 Bias Output	Pin 8	Pin 8	Pin 7	Pin 8	Pin 8	Pin 8	Pin 7

NOTES:

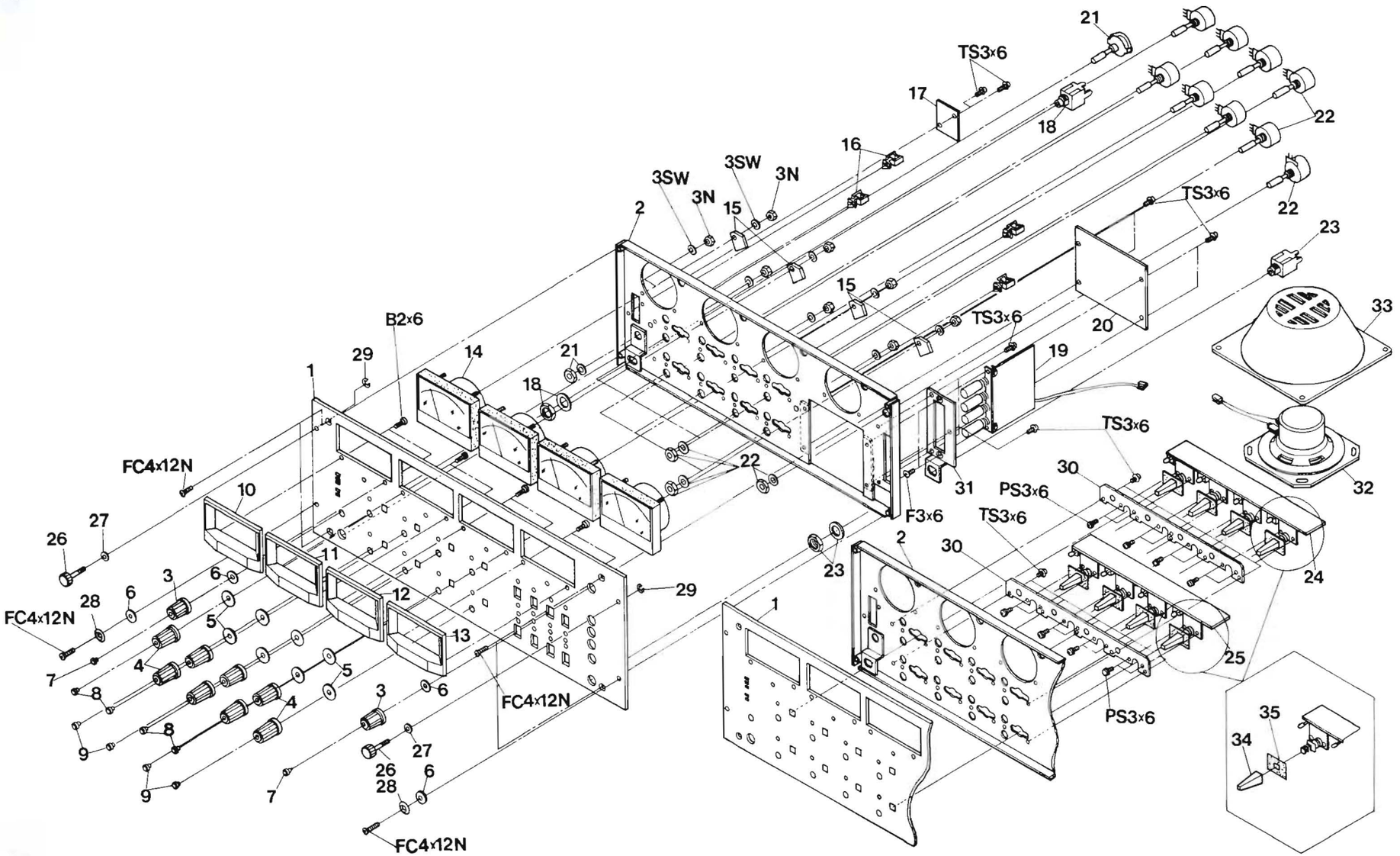
1. The values of the components those not specified above are common to all assemblies.
2. Resistance values are in ohms, 0.25W, 5%.
3. Capacitance values are in farads, 50V, 5%.
4. The value of *R240 of MTR-10-4, I, IAB, 4L, and IL follows the next table.

d	*R240
1.0 mm (0.039")	270(2W)
1.7 mm (0.067")	180(2W)

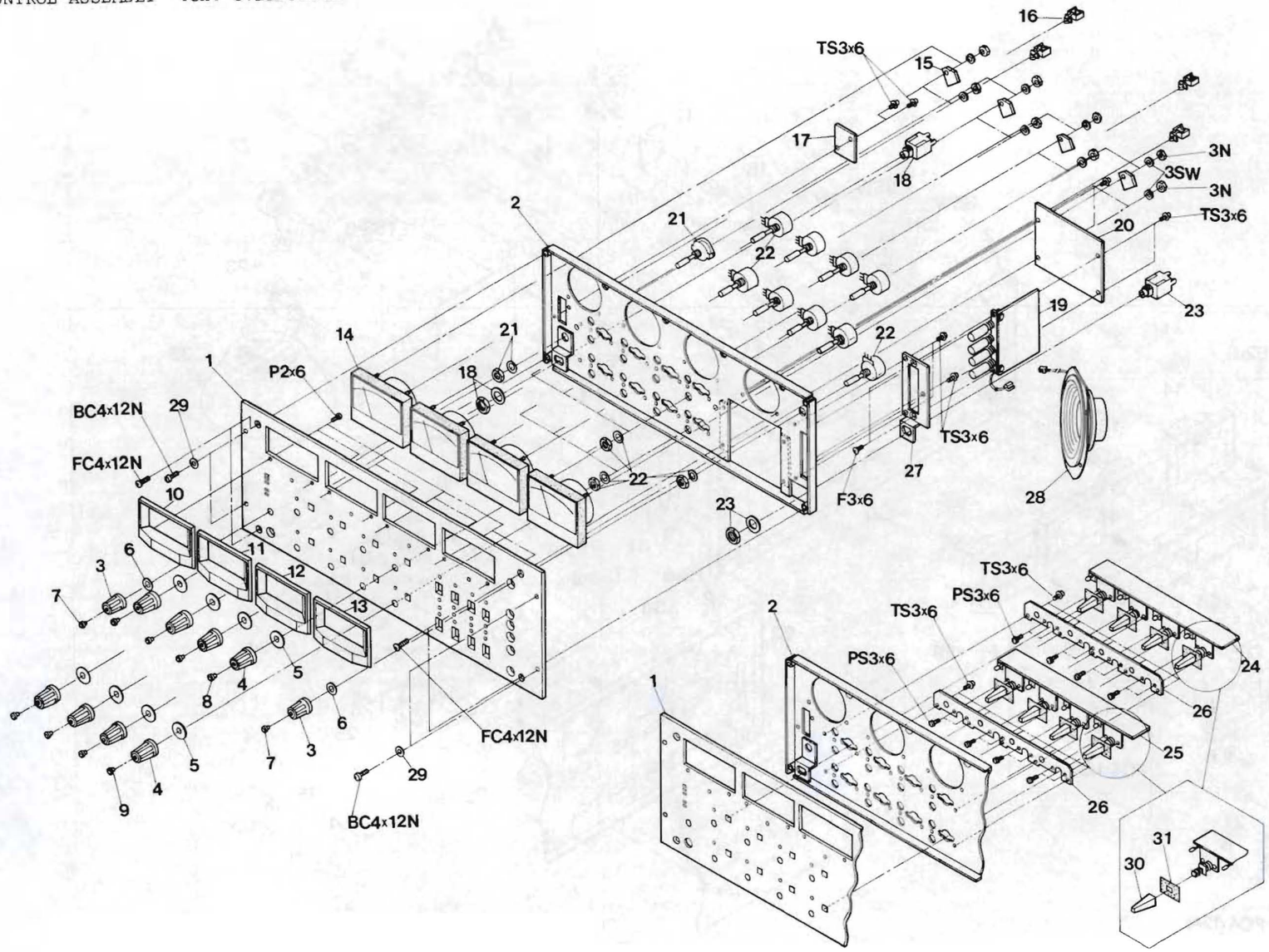
1/2" 4 TRACK
Erase HEAD



13. AUDIO CONTROL ASSEMBLY 4CH: LOW PROFILE



14. AUDIO CONTROL ASSEMBLY 4CH: OVERBRIDGE



PARTS LIST 14. AUDIO CONTROL ASSEMBLY 4CH: OVERBRIDGE

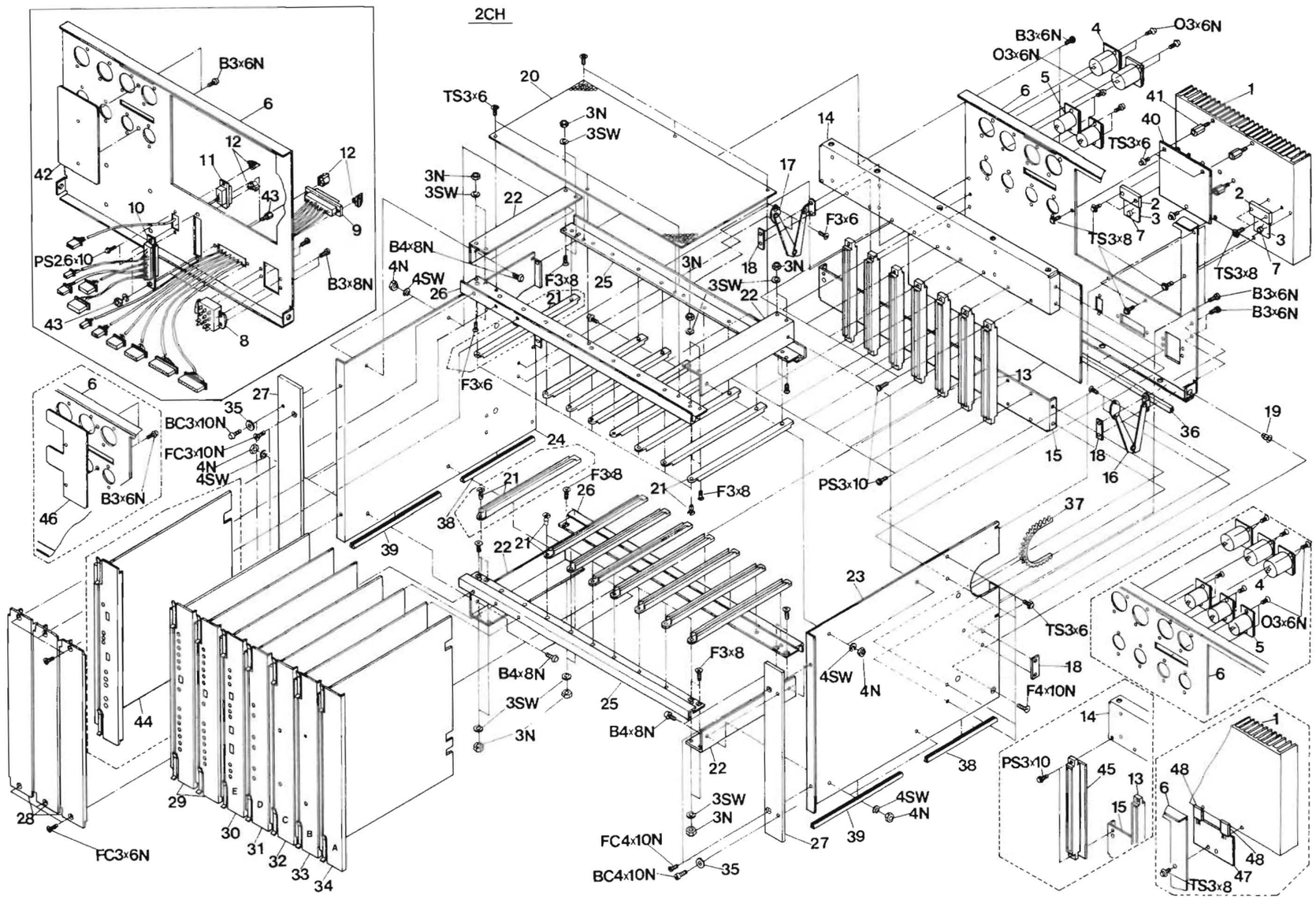
Ref. No.	Description	Parts No.	Notes
14- 1	Panel, Trim, Control	CB23901	
2	Panel, Chassis, Control	CB23902	
3	Knob, A, Control	KN1045	
4	Knob, B, Control	KN1046	
5	Washer, Knob, Control	KZ6C047	
6	Washer, Knob, Control	KZ6C048	
7	Cap, Knob, Control, Yellow	KN1052	
8	Cap, Knob, Control, Orange	KN1053	
9	Cap, Knob, Control, Blue	KN1050	
10	Escutcheon, CH 1, Meter	CB23308	
11	Escutcheon, CH 2, Meter	CB23309	
12	Escutcheon, CH 3, Meter	CB23310	
13	Escutcheon, CH 4, Meter	CB23311	
14	Meter, VU	ME11005	
	Meter Lamp	LU2049	
15	P.C.B. Ass'y, LED (C), Peak	PB-81J	
16	Clamp, Wire, Control	PZ1G029	
17	P.C.B. Ass'y, LED (H)	PB-82H	
18	Jack, Ext. Osc.	CN601142	
19	P.C.B. Ass'y, H.P. Amplifier	PB-15D	
	Switch	WH12112	
20	P.C.B. Ass'y, Control Switch	PB-76A	
21	Switch, Rotary	WH61038	
22	Potentiometer, Control	RV214080	
23	Jack, Phones	CN602143	
24	P.C.B. Ass'y, SRL Switch	PB-76BA	Upper
	Switch	WH12023	
25	P.C.B. Ass'y, SRL Switch	PB-76BAA	Lower
	Switch	WH12023	
26	Bracket, P.C.B. Ass'y	CB23313	
27	Bracket, P.C.B. Ass'y	CB23906A	
28	Speaker	SF1004	
29	Washer, Screw, Control	KZ6C043	
30	Button, SRL Switch	KN2067	
31	Felt, SRL Switch	PZ1B012	

PARTS LIST 15. AMPLIFIER ASSEMBLY 2CH

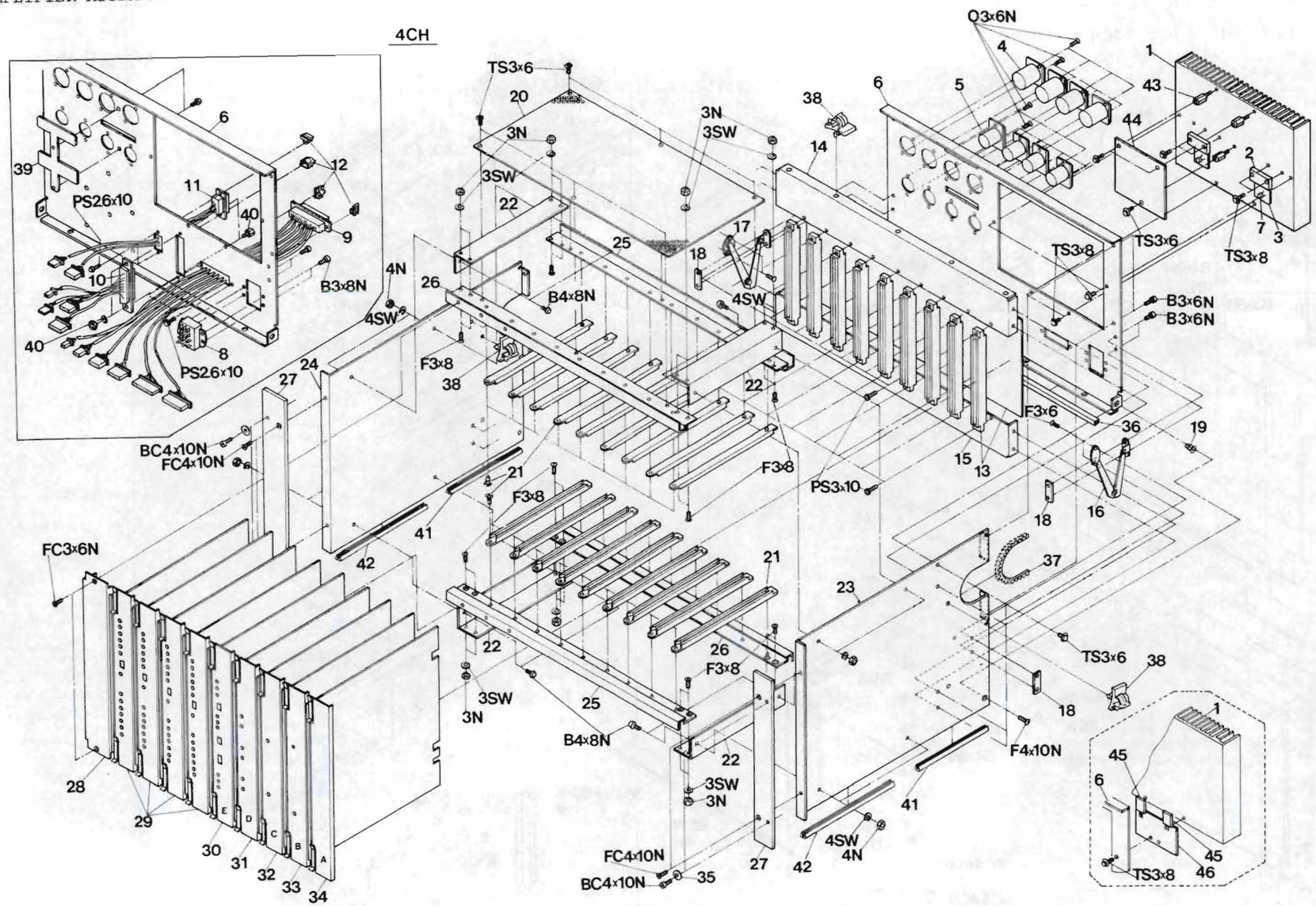
Ref. No.	Description	Parts No.	Notes
15- 1	Heat Sink	PZ4B075	
2	Transistor	QC2565Y	MTR-10 Refer to Nos. 47 & 48.
3	P.C.B., Transistor	PB9A393	
4	Connector, 3 soc.	CN103046	
5	Connector, 3 pin	CN103045	
6	Panel, Amp. Rear	A108001	
7	Capacitor, P.C.B.	CAF0100	
8	Connector Ass'y	CN7C-006	
9	Cable Ass'y, A	PZ9D036	Locator
10	Cable Ass'y, B	ZA-67D	Ext. Sync.
11	Cable Ass'y, C	PZ9D038	Noise Reduction
12	Bracket, Connector	CN7B-061	
13	P.C.B. Ass'y, Mother	PB-75SB	
14	Bracket, Upper, P.C.B.	A104406	
15	Bracket, Lower, P.C.B.	A104407	
16	Stay Arm, L	CY2015	
17	Stay Arm, R	CY2016	
18	Plate, Stay Arm	A104412	
19	Pivot, Chassis Rear	PZ1F016	
20	Panel, Amp. Chassis	A104410	
21	Guide Rail	CN7B-015	
22	Angle, Amp. Chassis	A104405	
23	Plate, B, Amp. Chassis	A104402	
24	Plate, A, Amp. Chassis	A104401	
25	Bracket, A, Guide Rail	A104403	
26	Bracket, B, Guide Rail	A104404	
27	Plate, Amp. Chassis	A104408	
28	Plate, Trim, Amp.	A104411	
29	P.C.B. Ass'y, Audio Amplifier	****	
30	P.C.B. Ass'y, Audio Control	****	
31	P.C.B. Ass'y, Capstan Control	****	
32	P.C.B. Ass'y, Reel Control	****	
33	P.C.B. Ass'y, Master CPU	****	
34	P.C.B. Ass'y, Transport Control	PB-44TA	
35	Washer, Amp. Chassis	KZ6C043	
36	Protector, Amp. Rear	PZ1G071	
37	Protector, Chassis Panel	PZ1G069	
38	Edging	PZ1G126	
39	Edging	PZ1G127	
40	P.C.B. Ass'y, Relay, I/O	PB-7CDA	
41	Stud	KZ9L200A	
42	Panel, Blank	A108002	
43	Nut	CN7B-212	
44	P.C.B. Ass'y, Time Code	PB-47RA	for Time Code Version
15-45	P.C.B. Ass'y, Sub Mother, Time Code	PB-79GA	for Time Code Version
46	Panel, Blank, Rear	A108801	"
47	P.C.B. Ass'y	PB-7AFA	for MTR-12
48	Transistor	QC3281O	"

**** Refer to another list on page 13-27.

15. AMPLIFIER ASSEMBLY 2CH



16. AMPLIFIER ASSEMBLY 4CH



PARTS LIST 16. AMPLIFIER ASSEMBLY 4CH

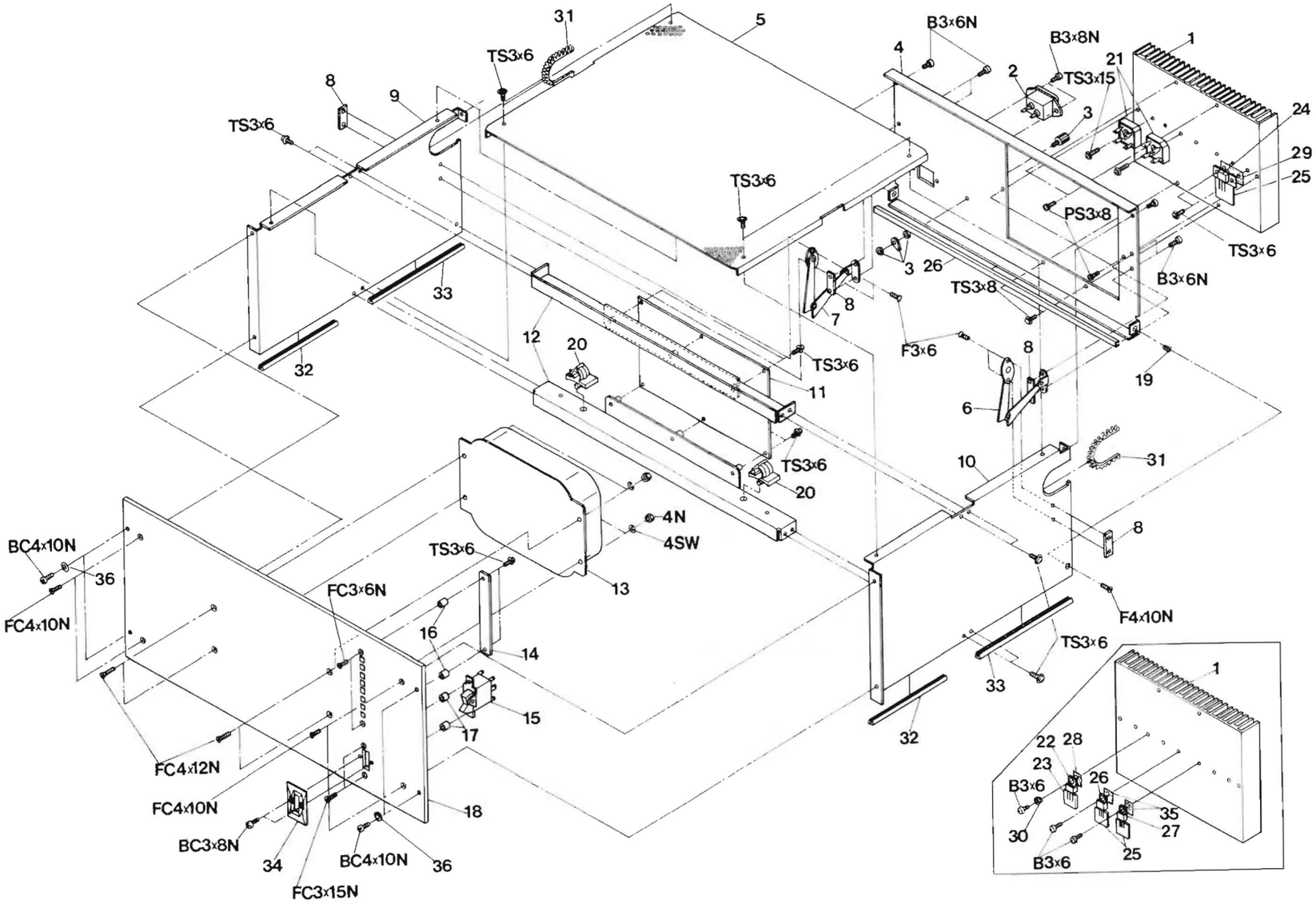
Ref. No.	Description	Parts No.	Notes
16- 1	Heat Sink	PZ4B075	
2	Transistor, Reel Motor Drive	QC2565Y	MTR-10
3	P.C.B., Transistor	PB9A393	
4	Connector, 3 soc.	CN103046	
5	Connector, 3 pin	CN103045	
6	Panel, Amp., Rear	A108001	
7	Capacitor, P.C.B.	CAF0100	
8	Connector Ass'y, 12 soc.	CN7C-006	
9	Cable Ass'y, A	PZ9D036	Locator
10	Cable Ass'y, B	ZA-67D	Ext. Sync.
11	Cable Ass'y, D	PZ9D039	Noise Reduction
12	Bracket, Connector	CN7B-061	
13	P.C.B. Ass'y, Mother	PB-76LB	
14	Bracket, Upper, P.C.B.	A104406	
15	Bracket, Lower, P.C.B.	A104407	
16	Stay Arm, L	CY2015	
17	Stay Arm, R	CY2016	
18	Plate, Stay Arm	A104412	
19	Pivot, Chassis Rear	PZ1F016	
20	Panel, Amp. Chassis	A104410	
21	Guide Rail	CN7B-015	
22	Angle, Amp. Chassis	A104405	
23	Plate, B, Amp. Chassis	A104402	
24	Plate, A, Amp. Chassis	A104401	
25	Bracket, A, Guide Rail	A104403	
26	Bracket, B, Guide Rail	A104404	
27	Plate, Amp. Chassis	A104408	
28	Plate, Trim, Amp.	A104411	
29	P.C.B. Ass'y, Audio Amplifier	****	
30	P.C.B. Ass'y, Audio Control	****	
31	P.C.B. Ass'y, Capstan Control	****	
32	P.C.B. Ass'y, Reel Control	****	
33	P.C.B. Ass'y, Master CPU	****	
34	P.C.B. Ass'y, Transport Control	PB-44TA	
35	Washer, Amp. Chassis	KZ6C043	
36	Protector, Amp., Rear	PZ1G071	
37	Protector, Chassis, Panel	PZ1G069	
38	Clamp, Wire, Panel	PZ1G057	
39	Panel, Blank, Rear	A108201	
40	Nut	CN7B-212	
41	Edging	PZ1G126	
42	Edging	PZ1G127	
43	Stud	KZ9L200A	
44	P.C.B. Ass'y, Relay, I/O	PB-7CDA	
45	Transistor	QC3281O	
46	P.C.B. Ass'y, Relay, Transistor	PB7AFA	MTR-12

**** Refer to another list on page 13-27.

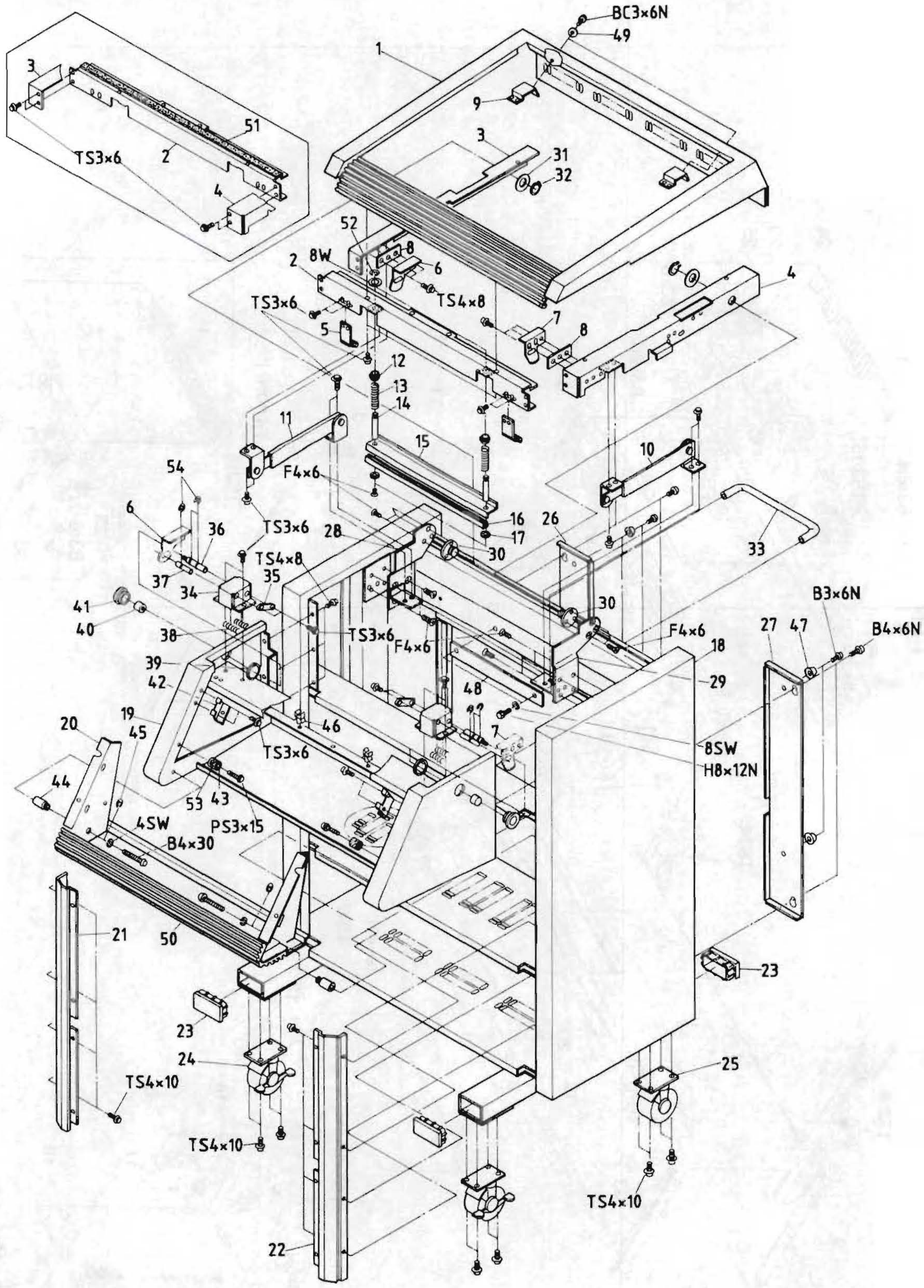
PARTS LIST 17. POWER SUPPLY ASSEMBLY

Ref. No.	Description	Parts No.	Notes
17- 1	Heat Sink	PZ4B075	
2	Connector, AC Inlet	CN03012	
3	Terminal, Ground	CN901040	
4	Panel, Chassis Rear	DS1Y008	
5	Panel, Chassis Upper	DS1Y009	
6	Stay Arm, L	CY2015	
7	Stay Arm, R	CY2016	
8	Plate, Stay Arm	A104412	
9	Plate, L, Chassis	DS1Y002	
10	Plate, R, Chassis	DS1Y003	
11	P.C.B. Ass'y, Power Supply	PB-62LB	
12	Bracket Ass'y, Chassis	DS-1Y-A	
13	Transformer, Power	TF11058B	MTR-10
	Transformer, Power	TF11075A	MTR-12
14	P.C.B. Ass'y, P.S. LED	PB-82K	
15	Switch, Power	WH92018	
16	Spacer, P.C.B.	KZ9A075B	
17	Spacer, Power Switch	KZ9E075B	
18	Panel, Trim, Power Supply	DS1Y001A	MTR-10
	Panel, Trim, Power Supply	DS2E005	MTR-12
19	Pivot, Chassis Rear	PZ1F016	
20	Clamp, Wire	PZ1G100	
21	Rectifier, Bridge Connection	PN-0143	
22	IC, Regulator	IHC14324	
23	P.C.B., Transistor	PB9A385	
24	Transistor, Power	QC2565Y	
25	P.C.B., Transistor	PB9A393	
26	Transistor, +26V	QB863O	
27	Transistor, -26V	QD1184O	
28	Sheet, Transistor, Insulation	PZ4B054	
29	Sheet, Power Transistor, Insulation	PZ4B055	
30	Washer, Transistor, Insulation	PZ4B036	
31	Protector, Chassis, Panel	PZ1G068	
32	Edging	PZ1G126	
33	Edging	PZ1G127	
34	Protector	KN5007	
35	Sheet, Transistor, Insulation	PZ4B068	
36	Washer, Trim	KZ6C043	

17. POWER SUPPLY ASSEMBLY



18. CASE ASSEMBLY: LOW PROFILE MTR-10

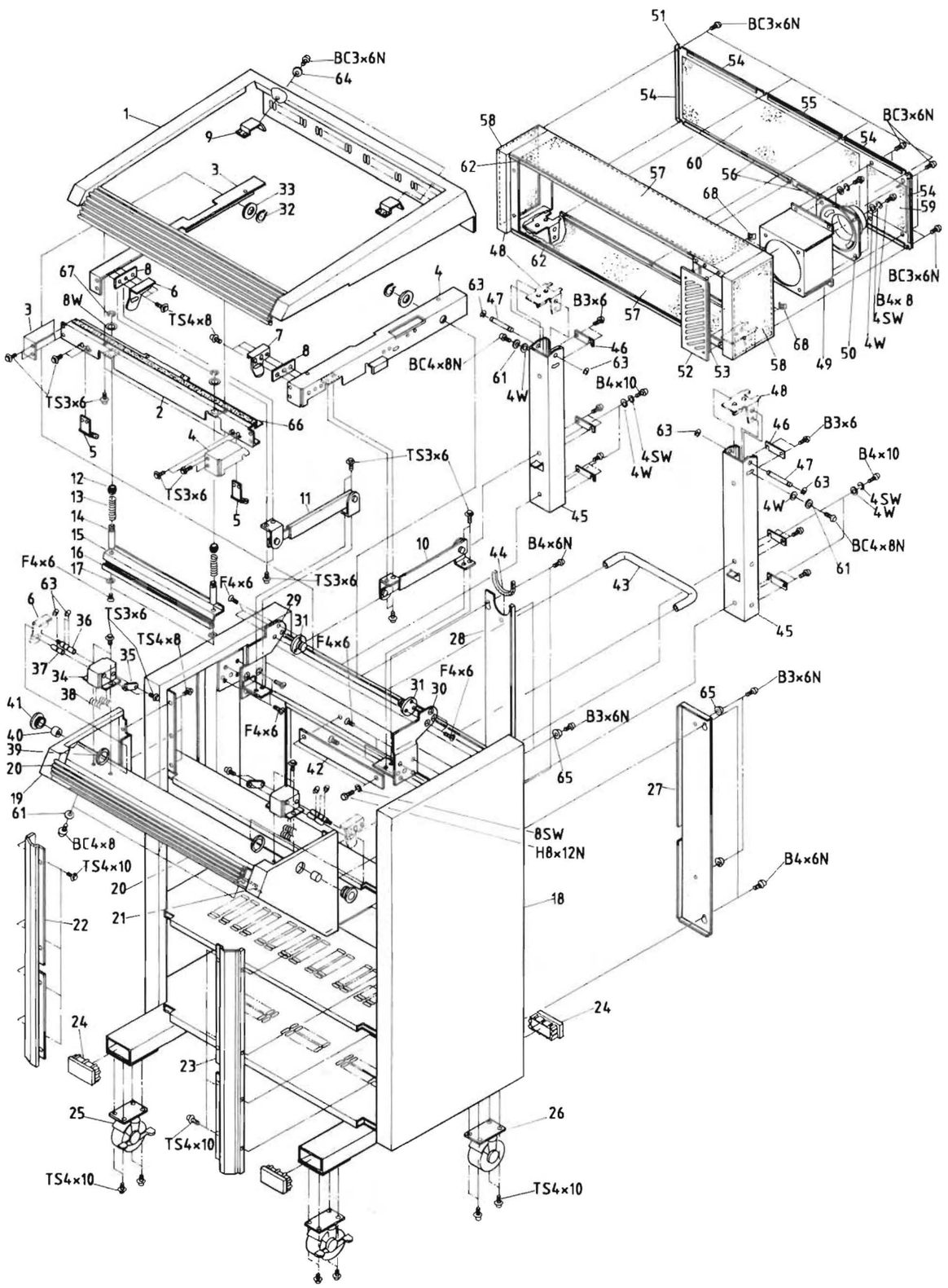


PARTS LIST 18. CASE ASSEMBLY: LOW PROFILE MTR-10

Ref. No.	Description	Parts No.	Notes
18- 1	Cover, Upper Case	K1084-C	
2	Bracket, Spring	K108424	
3	Bracket, L, Panel	K108422	
4	Bracket, R, Panel	K108423	
5	Angle, Stopper	K1055-A	
6	Stopper, L	K105541	
7	Stopper, R	K105564	
8	Spacer	K105560A	
9	Bracket, Case Cover	K108426	
10	Stay Arm, R	CY2024	
11	Stay Arm, L	CY2025	
12	Bush	K108428	
13	Spring	GS2086	
14	Shaft	K108427	
15	Angle	K108425	
16	Edging	PZ7G102	
17	Washer	KZ6C074	
18	Case	K1084-B	
19	Case Front	K1084-F	
20	Chassis, Case Front	K105532	
21	Sash, L, Case	K108430	
22	Sash, R, Case	K108431	
23	Cap, Leg	K108429	
24	Caster, Lock Type	CY4057	
25	Caster, Non Lock Type	CY4056	
26	Plate, L, Case Rear	K108433	
27	Plate, R, Case Rear	K108432	
28	Plate, L, Frame	K107082	
29	Plate, R, Frame	K107083	
30	Boss	K105552	
31	Washer, Frame	KZ6C050	
32	Retaining Ring, C Type	F7216-T	
33	Handle, Stainless	CY1037	
34	Bracket, Latch	K105539	
35	Plate, Latch	K105540	
36	Shaft, B, Latch	K105538	
37	Shaft, A, Latch	K105537	
38	Spring, Latch	GS2071	
39	"O" Ring	PZ1E004	
40	Button, Latch	K105545	
41	Escutcheon, Button	K105546	
42	Bracket, Case Front	K107024	
43	Stud, Case Front	KZ7A107	
44	Pivot, Case Front	K105548	
45	Retaining Ring, E Type	F74TE24	
46	Saddle, Wire	PZ1G029	
47	Foot, Case Plate	CY4009	
48	Spacer, Handle	K108434	
49	Washer, Cover	KZ6C044	
18-50	Rubber, Protector	K105557	
51	Blind	K105566	
52	Retaining Ring, E Type	F74TE22	
53	Damper	PZ1C045	
54	Retaining Ring, E Type	F74TE22	

PARTS LIST 19. CASE ASSEMBLY: OVERBRIDGE MTR-10

Ref. No.	Description	Parts No.	Notes
19- 1	Cover, Upper Case	K1084-C	
2	Bracket, Spring	K108424	
3	Bracket, Panel, L	K108422	
4	Bracket, Panel, R	K108423	
5	Angle, Stopper	K1055-A	
6	Stopper, L	K105541	
7	Stopper, R	K105564	
8	Spacer	K105560A	
9	Bracket, Case Cover	K108426	
10	Stay Arm, R	CY2024	
11	Stay Arm, L	CY2025	
12	Bush	K108428	
13	Spring	GS2086	
14	Shaft	K108427	
15	Angle	K108425	
16	Edging	PZ1G102	
17	Washer	KZ6C074	
18	Case	K1084-B	
19	Case Front	K1085-C	
20	Rubber, Protector	K105557	
21	Bracket, Protector	K106407	
22	Sash, L, Case	K108430	
23	Sash, R, Case	K108431	
24	Cap, Leg	K108429	
25	Caster, Lock Type	CY4057	
26	Caster, Non Lock Type	CY4056	
27	Plate, R, Case Rear	K108432	
28	Plate, L, Case Rear	K108507	
29	Plate, L, Frame	K107082	
30	Plate, R, Frame	K107083	
31	Boss	K105552	
32	Retaining Ring, C Type	F7216-T	
33	Washer, Frame	KZ6C050	
34	Bracket, Latch	K105539	
35	Plate, Latch	K105540	
36	Shaft, B, Latch	K105538	
37	Shaft, A, Latch	K105537	
38	Spring, Latch	GS2071	
39	"O" Ring	PZ1E004	
40	Button, Latch	K105545	
41	Escutcheon, Button	K105546	
42	Bracket, Case Front	K108434	
43	Handle, Stainless	CY1037	
44	Protector, Plate, Case Rear	PZ1G078	
45	Stay, Case, Overhead	K108521	
46	Plate, Stay	K108508	
47	Pin, Stay	K108522	
48	Case, Meter Bridge	K1085-B	
49	Bracket, Speaker	K108510	
19-50	Speaker	SF1004	
51	Cover, Case, Overhead	K108509	
52	Grille, Case, Overhead	K106420	
53	Net, Grille	K106423	
54	Spacer, A	K108515	
55	Spacer, B	K108516	
56	Spacer, D	K108518	
57	Sheet, Case, Overhead, A	K108511	
58	Sheet, Case, Overhead, B	K108512	
59	Sheet, Case, Overhead, C	K108513	
60	Sheet, Case, Overhead, D	K108514	
61	Washer	KZ6C043	
62	Spacer	K106434	
63	Retaining Ring, E Type	F74TE20	
64	Washer	KZ6C044	
65	Foot, Case Plate	CY4009	
66	Blind	K105566	
67	Retaining Ring, E Type	F74TE22	
68	Plate Nut	PZ1F048	


BC3×6N
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67
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8W
TS4×8
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TS3×6
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8
4
BC4×8N
63
47
B3×6
46
63
61
4W
B4×10
4SW
4W
TS3×6
4
TS3×6
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14
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F4×6
F4×6
TS3×6
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TS3×6
TS4×8
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F4×6
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F4×6
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F4×6
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BC4×8
TS4×10
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TS4×10
TS4×10
B4×6N
44
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BC3×6N
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BC3×6N
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BC3×6N
B4×8
4SW
4W
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B3×6
63
47
4W
4SW
4W
B4×10
4W
63
47
4SW
4W
BC4×8N
61
45
B3×6N
65
B3×6N
65
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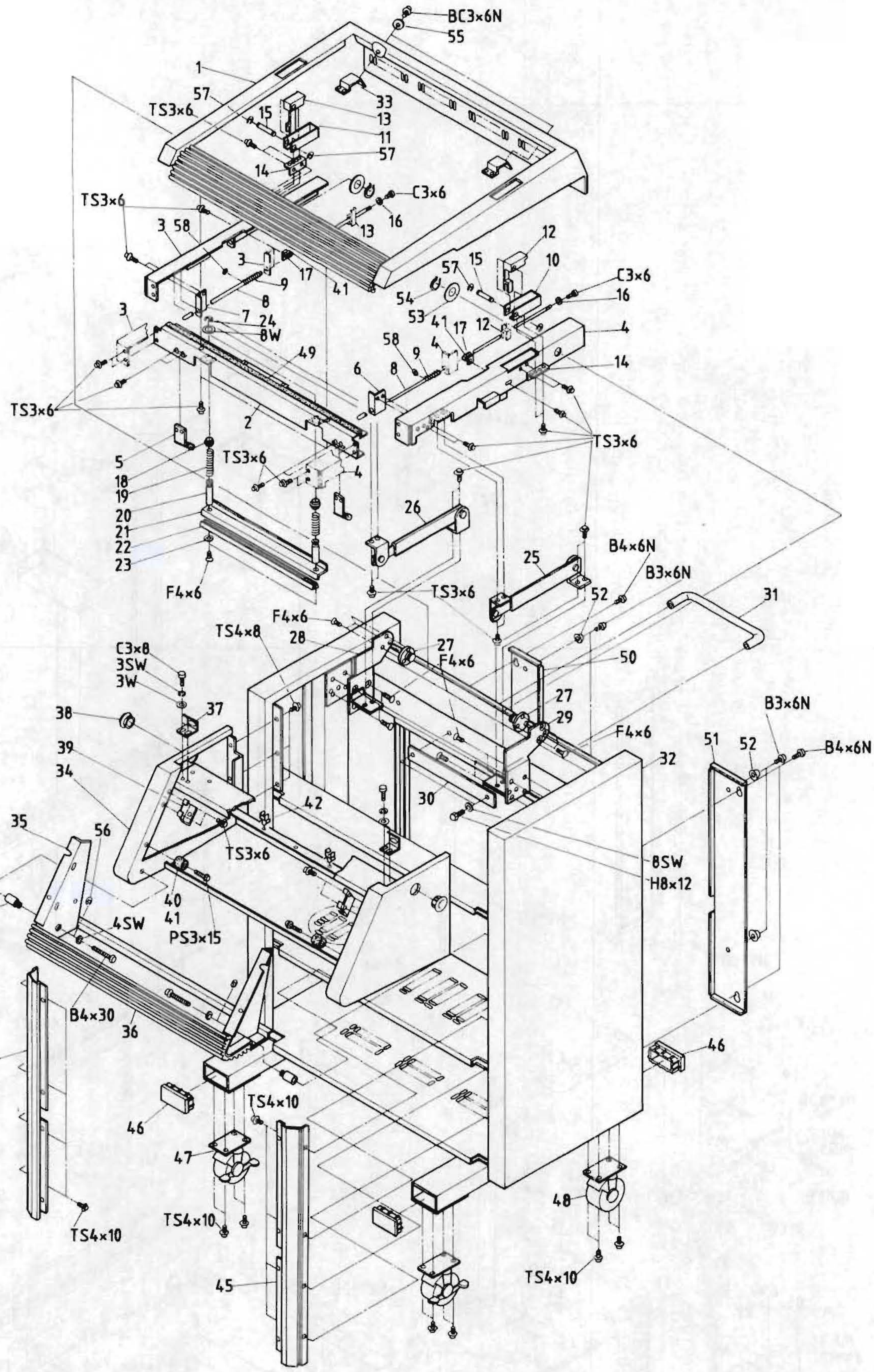
8SW
H8×12N
18
B4×6N
24
26
TS4×10

20. CASE ASSEMBLY: LOW PROFILE MTR-12



PARTS LIST 20. CASE ASSEMBLY: LOW PROFILE MTR-12

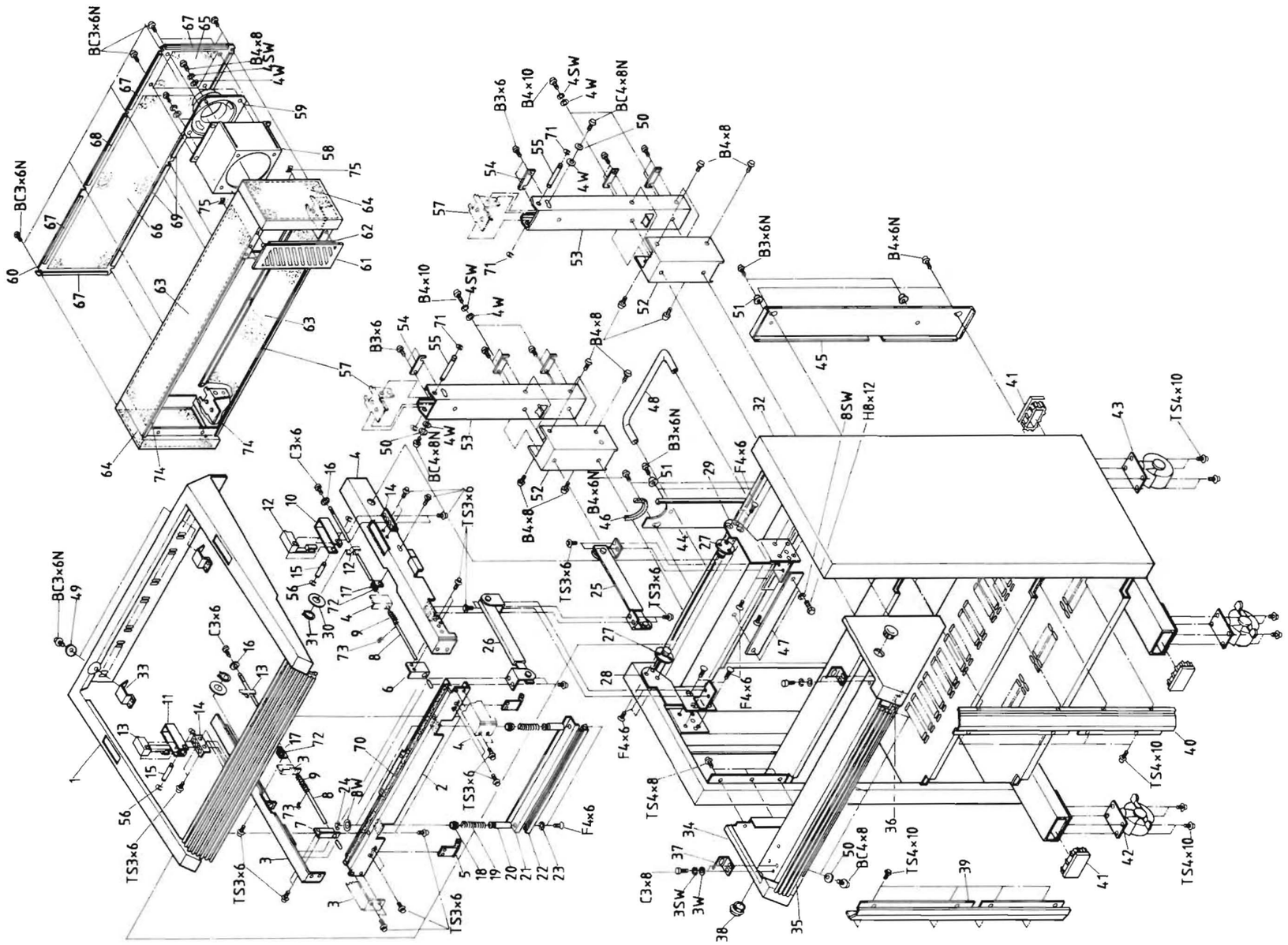
Ref. No.	Description	Parts No.	Notes
20- 1	Cover, Upper Case	K1086-B	
2	Bracket, Spring	K108424	
3	Bracket, L, Panel	K108422	
4	Bracket, R, Panel	K108423	
5	Angle, Stopper	K1055-A	
6	Hanger, R	K107050	
7	Hanger, L	K107051	
8	Shaft	K107079	
9	Spring	GS2081	
10	Holder, R	K107076	
11	Holder, L	K107077	
12	Lever, R	K1070-A	
13	Lever, L	K1070-B	
14	Angle, L, Shape	K107054	
15	Pin	K107078	
16	Collar, Stopper	K107059	
17	Stopper, A	K107075	
18	Holder, Spring	K108428	
19	Spring	GS2086	
20	Shaft	K108427	
21	Angle	K108425	
22	Edging	PZ1G102	
23	Washer	KZ6C074	
24	Retaining Ring, E Type	F74TE22	
25	Stay Arm, R	GY2024	
26	Stay Arm, L	CY2025	
27	Shaft Frame	K105552	
28	Plate, L, Frame	K107082	
29	Plate, R, Frame	K107083	
30	Bracket, Case Front	K108434	
31	Handle, Stainless	CY1037	
32	Case	K1084-B	
33	Bracket, Case Cover	K108426	
34	Case Front	K1084-F	
35	Chassis	K105532	
36	Rubber, Protector	K105557	
37	Stopper	K107055	
38	Plug, Hole	PZ1G106	
39	Bracket, Case Front	K107024	
40	Stud, Case Front	KZ7A-107	
41	Damper	PZ1C045	
42	Saddle, Wire	PZ1G029	
43	Pivot, Case Front	K105548	
44	Sash, L, Case	K108430	
45	Sash, R, Case	K108431	
46	Cap, Leg	K108429	
47	Caster, Lock Type	CY4057	
48	Caster, Non Lock Type	CY4056	
49	Blind	K105566	

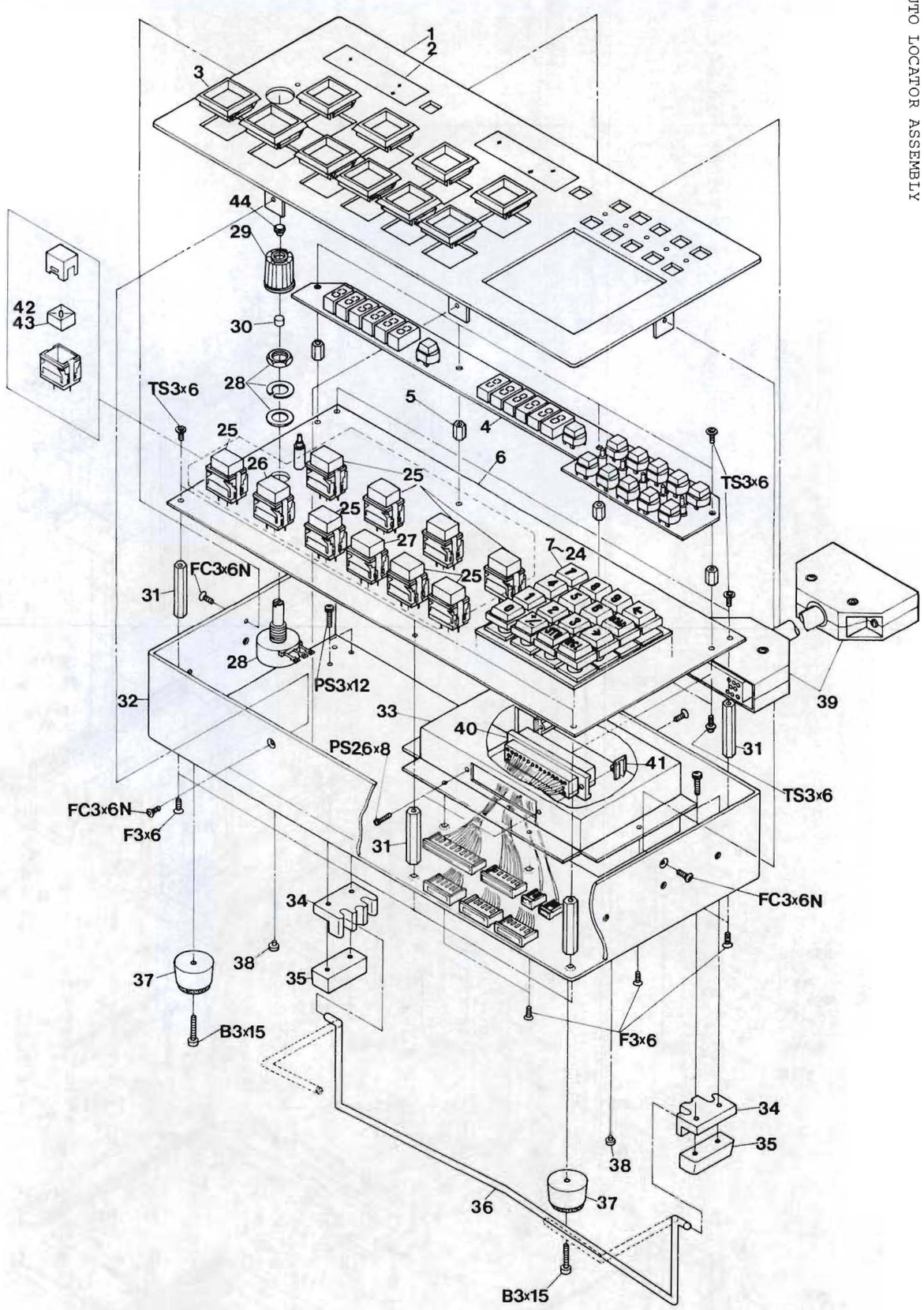
Ref. No.	Description	Parts No.	Notes
20-50	Plate, L, Case Rear	K108433	
51	Plate, R, Case Rear	K108432	
52	Foot, Case Plate	CY4009	
53	Washer, Frame	KZ6C050	
54	Retaining Ring, E Type	F7216-T	
55	Washer	KZ6C044	
56	Retaining Ring, E Type	F74TE24	
57	Retaining Ring, E Type	F7053	
58	Retaining Ring, E Type	F7504	

PARTS LIST 21. CASE ASSEMBLY: OVERBRIDGE MTR-12

Ref. No.	Description	Parts No.	Notes
21- 1	Cover, Upper Case	K1086-B	
2	Bracket, Spring	K108424	
3	Bracket, Panel, L	K108422	
4	Bracket, Panel, R	K108423	
5	Angle, Stopper	K1055-A	
6	Hanger, R	K107050	
7	Hanger, L	K107051	
8	Shaft	K107079	
9	Spring	GS2081	
10	Holder, R	K107076	
11	Holder, L	K107077	
12	Lever, R	K1070-A	
13	Lever, L	K1070-B	
14	Angle, L, Shape	K107054	
15	Pin	K107078	
16	Collar, Stopper	K107059	
17	Stopper, A	K107075	
18	Holder, Spring	K108428	
19	Spring	GS2086	
20	Shaft	K108427	
21	Angle	K108425	
22	Edging	PZ1G102	
23	Washer	KZ6C074	
24	Retaining Ring, F Type	F74TE22	
25	Stay Arm, R	CY2024	
26	Stay Arm, L	CY2025	
27	Shaft Frame	K105552	
28	Plate, L, Frame	K107082	
29	Plate, R, Frame	K107083	
30	Washer	KZ6C050	
31	Retaining Ring, E Type	F7216-T	
32	Case	K1084-B	
33	Bracket, Case Cover	K108426	
34	Case Front	K1085-C	
35	Rubber, Protector	K105557	
36	Bracket, Protector	K106407	
37	Stopper	K107055	
38	Plug, Hole	PZ1G106	
39	Sash, L, Case	K108430	
40	Sash, R, Case	K108431	
41	Cap, Leg	K108429	
42	Caster, Lock Type	CY4057	
43	Caster, Non Lock Type	CY4056	
44	Plate, L, Case Rear	K108507	
45	Plate, R, Case Rear	K108432	
46	Protector, Plate, Rear	PZ1G078	
47	Bracket, Case Front	K108434	
48	Handle, Stainless	CY1037	
49	Washer	KZ6C044	
21-50	Washer	KZ6C043	
51	Foot, Case Plate	CY4009	
52	Joint	K108701	
53	Stay, Case, Overhead	K108521	
54	Plate, Stay	K108508	
55	Pin, Stay	K108522	
56	Retaining Ring, E Type	F7503	
57	Case, Meter Bridge	K1085B	
58	Bracket, Speaker	K108510	
59	Speaker	SF1004	
60	Cover, Case, Overhead	K108509	
61	Grille, Case, Overhead	K106420	
62	Net, Grille	K106423	
63	Sheet, Case, Overhead, A	K108511	
64	Sheet, Case, Overhead, B	K108512	
65	Sheet, Case, Overhead, C	K108513	
66	Sheet, Case, Overhead, D	K108514	
67	Spacer, A	K108515	
68	Spacer, B	K108516	
69	Spacer, D	K108518	
70	Blind	K105566	
71	Retaining Ring, E Type	F74TE20	
72	Damper	PZ1C045	
73	Retaining Ring, E Type	F7504	
74	Spacer	K106434	
75	Plate, Nut	PZ1F048	

21. CASE ASSEMBLY: OVERBRIDGE MTR-12

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42
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TS3x6
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FC3x6N
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PS3x12
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PS26x8
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31
TS3x6
FC3x6N
F3x6
31
34
FC3x6N
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37
35
B3x15
F3x6
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B3x15

PARTS LIST 22. AUTO LOCATOR ASSEMBLY

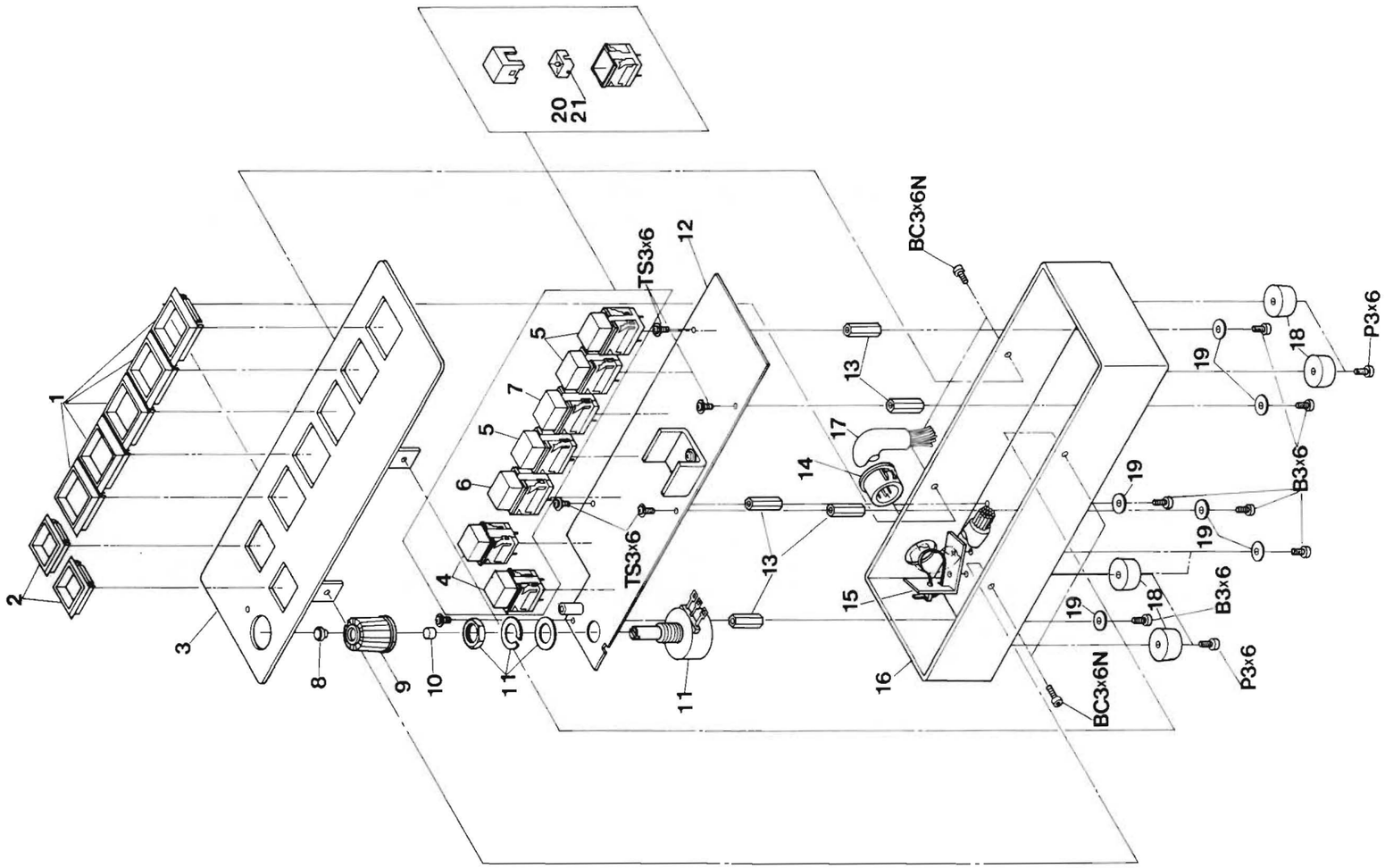
Ref. No.	Description	Parts No.	Notes
22- 1	Panel, Trim	CB10901	
2	Screen	CB10906	
3	Protector, A, Button	PZ4A013	
4	P.C.B. Ass'y, LED	PB-82U	
	LED, Segment	PN-0153	
	LED, Yellow	PNTLY206	
	Switch, Gray	WH11084C	
	Switch, Ivory	WH11084I	
	Switch, Yellow	WH11084Y	
5	Stud, P.C.B.	KZ7B806	
6	P.C.B. Ass'y, Locator	PB-45F	
7	Switch, Key	WH11085	
8	Key Top, 0, Switch	KN2074	
9	Key Top, 1, Switch	KN2053	
10	Key Top, 2, Switch	KN2054	
11	Key Top, 3, Switch	KN2055	
12	Key Top, 4, Switch	KN2056	
13	Key Top, 5, Switch	KN2057	
14	Key Top, 6, Switch	KN2058	
15	Key Top, 7, Switch	KN2059	
16	Key Top, 8, Switch	KN2060	
17	Key Top, 9, Switch	KN2061	
18	Key Top, LOAD, Switch	KN2062	
19	Key Top, RCL Switch	KN2063	
20	Key Top, STO, Switch	KN2064	
21	Key Top, → , Switch	KN2065	
22	Key Top, ← , Switch	KN2066	
23	Key Top, +/-, Switch	KN2073	
24	Bracket, Key	CB10907	
25	Switch, Push, White	WH11117W	
26	Switch, Push, Red	WH11117R	
27	Switch, Push, Blue	WH11117U	
28	Potentiometer, Pitch Control	RV014026	
29	Knob, A, Pitch Control	KN1045	
30	Spacer, Knob	KZ7A838	
31	Stud, P.C.B.	KZ7B805	
32	Case, Auto Locator	CB10904	
33	Plate, Connector	CB10905	
34	Holder, Stand	CY4055	
35	Foot, Stand	CY4054	
36	Stand, Case	CY4051	
37	Foot, Case	CY4046	
38	Cushion, Case	PZ1C008	
39	Cable Ass'y, Locator	ZA-62L	
40	Cable Ass'y, Locator	ZA-62Q	
41	Bracket, Connector	CN7B-061	
42	Lamp, Switch, Large	LU2039	
43	Lamp, Switch, Small	LU2040	

PARTS LIST 23. REMOTE CONTROL BOX ASSEMBLY

Ref. No.	Description	Parts No.	Notes
23- 1	Protector, A, Button	PZ4A013	
2	Protector, B, Button	PZ4A014	
3	Panel, Trim	CB11101	
4	Switch, Push, White	WH11118W	SEARCH ZERO, CUE
5	Switch, Push, White	WH11117W	PLAY, F.F, RWD
6	Switch, Push, Red	WH11117R	RECORD
7	Switch, Push, Blue	WH11117U	STOP
8	Cap, Knob	KN1048	
9	Knob, A, Speed	KN1045	
10	Spacer, Knob	KZ7A838	
11	Potentiometer, Pitch Control	RV014026	
12	P.C.B. Ass'y, Remote Control	PB-82V ***	
13	Stud, P.C.B.	KZ7B113	
14	Bush, Cord	PZ1G012	
15	Plate, Cord Clamp	CB11105	
16	Case, Remote Control	CB11104	
17	Cable Ass'y, Remote Control	ZA-62R	
18	Foot, Case	CY4009	
19	Washer, Case	KZ6C011	
20	Lamp, Switch	LU2039	
21	Lamp, Switch	LU2040	

*** Include switches (Ref. Nos. 4, 5, 6, 7) and Potentiometer (Ref. Nos. 8, 9, 10, 11).

23. REMOTE CONTROL BOX ASSEMBLY



MTR-12II SERIES TAPE RECORDER

SCHEMATIC DIAGRAMS (1/2)

TYPE J～

OTARI PART No.	ASSEMBLY NAME	DWG. No.
KH4X00B	Head Assembly (2 Channel)	4-28746
KH2J00C	Head Assembly (4 Channel)	4-28747
KH41F0B	Head Assembly (1 Channel)	4-30536
KH41W0A	Head Assembly (Time Code)	4-37482
CB2810A	Audio Control Assembly (2 Channel)	3-10151
CB2390B	Audio Control Assembly (4 Channel)	3-7124
PB14Y0A	Headphone Amplifier PCB Assembly	4-39016
PB15D0A	Headphone Amplifier PCB Assembly	4-39017
A10800A	Amplifier Assembly (2 Channel)	3-11655
A10820A	Amplifier Assembly (4 Channel)	3-10060
PB44X0A	Audio Control PCB Assembly	3-10155
PB14X0A	Audio Amplifier PCB Assembly (High)	3-10156
PB1500A	Audio Amplifier PCB Assembly (Low)	3-10157
	Variation of The MTR-10II/MTR-12II Amplifier PCB Assembly	3-13828
PB75S0A	Mother PCB Assembly (2 Channel)	3-10313
PB76L0A	Mother PCB Assembly (4 Channel)	3-10314
T00250C	Tape Transport Assembly	3-10159
PB44T0A	Transport Control PCB Assembly	3-10152
PB4GE0A	Master CPU PCB Assembly	3-14559
PB44W0A	Capstan Control PCB Assembly	3-10154
PB45C0A	Capstan Drive PCB Assembly	3-10150
PB46V0A	Reel Control PCB Assembly	3-10161
PB44Y0A	Supply Reel Tach PCB Assembly	4-27705
PB44Z0A	Takeup Reel Tach PCB Assembly	4-27706
PB45A0A	Roller Tach PCB Assembly	4-39015
PB46U0A	Reel Size Detect PCB Assembly	3-10160
PB45B0A	Timer Drive PCB Assembly	4-39012
PB82G0A	Timer Display PCB Assembly	4-39013
PB45M0A	Speed Calculate PCB Assembly	4-39014
DS1Y00B	Power Supply Assembly	3-10158
PB7UJ0A	Hook Up PCA	4-45734

CONTINUED ON NEXT PAGE

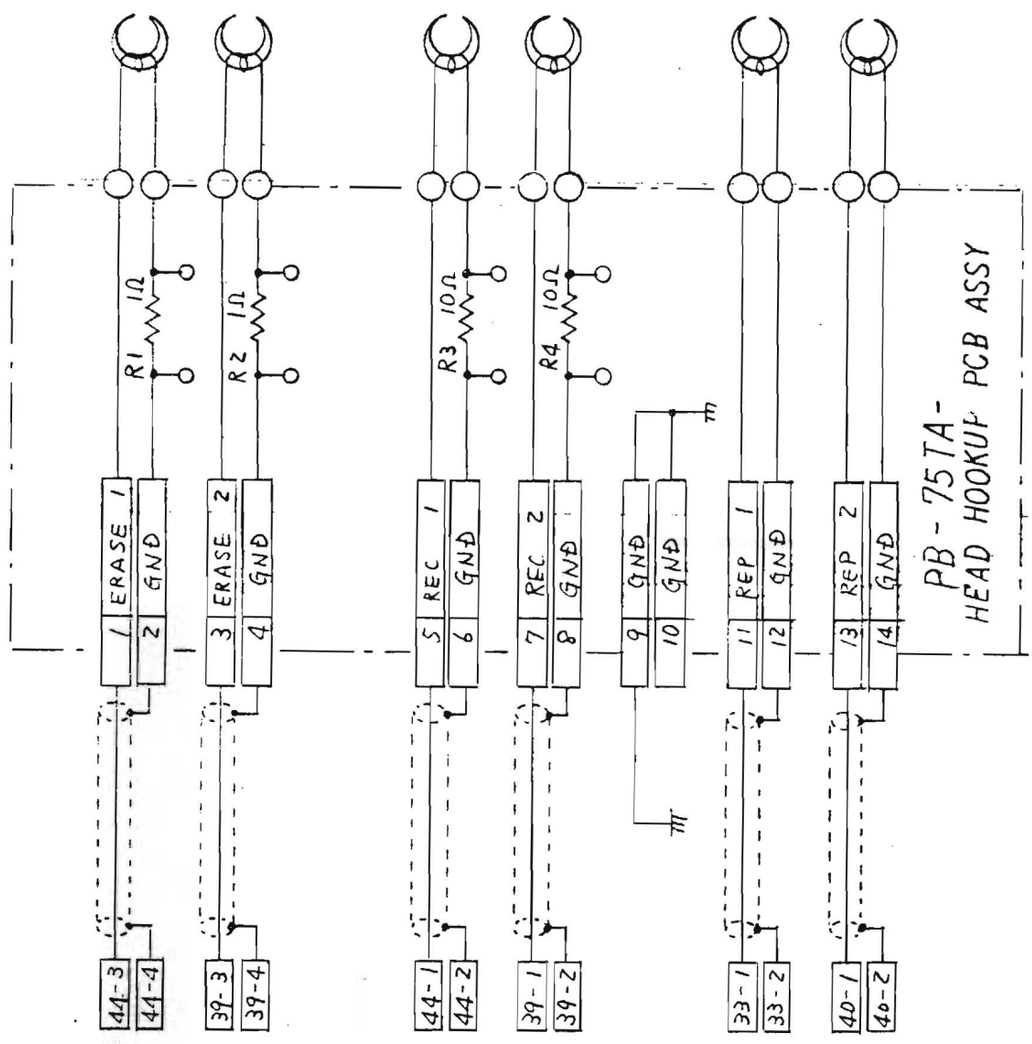
MTR-12II SERIES TAPE RECORDER

SCHEMATIC DIAGRAMS (2/2)

TYPE J～

OTARI PART No.	ASSEMBLY NAME	DWG. No.
CB1110B	Remote Control Box	4-39019
PB79G0A	Sub Mother PCB Assembly	4-37630
PB47R0B	Time Code PCB Assembly	3-13184
PB17X0A	Filter PCA	3-11639
PB7AF0A	Transister Hook Up PCB Assembly	4-37624
PB7CD0A	I/O Hook Up PCB Assembly	4-39695
CB1090B	AUTO LOCATOR	3-6445
PB45F0A	Locator PCB Assembly	3-6444
PB82U0A	LED PCB Assembly	3-6441

元図	作成図	取説図
4-29503	4-28618	4-28746



TYPE NO(**A**)TO
( )AT THE END

THIS SCHEMATIC DIAGRAM IS APPLIED TO	KH-41N	KH-4X	KH-41J	KH-41K	KH-41C	KH-2N

MRK	REV. No.	DATE	DWN	APP
7				
6				
5				
4				
3				
2				
1				

DRAWN 2182-2-25
DESIGNED
CHECKED
APPROVED
MATERIAL
FINISH

OTARI Otari Electric Co.,Ltd.

NAME HEAD ASSEMBLY

PART No. KH4X00B

SCALE / DIMENSION mm / THIRD ANGLE PROJECTION

SHEET OF

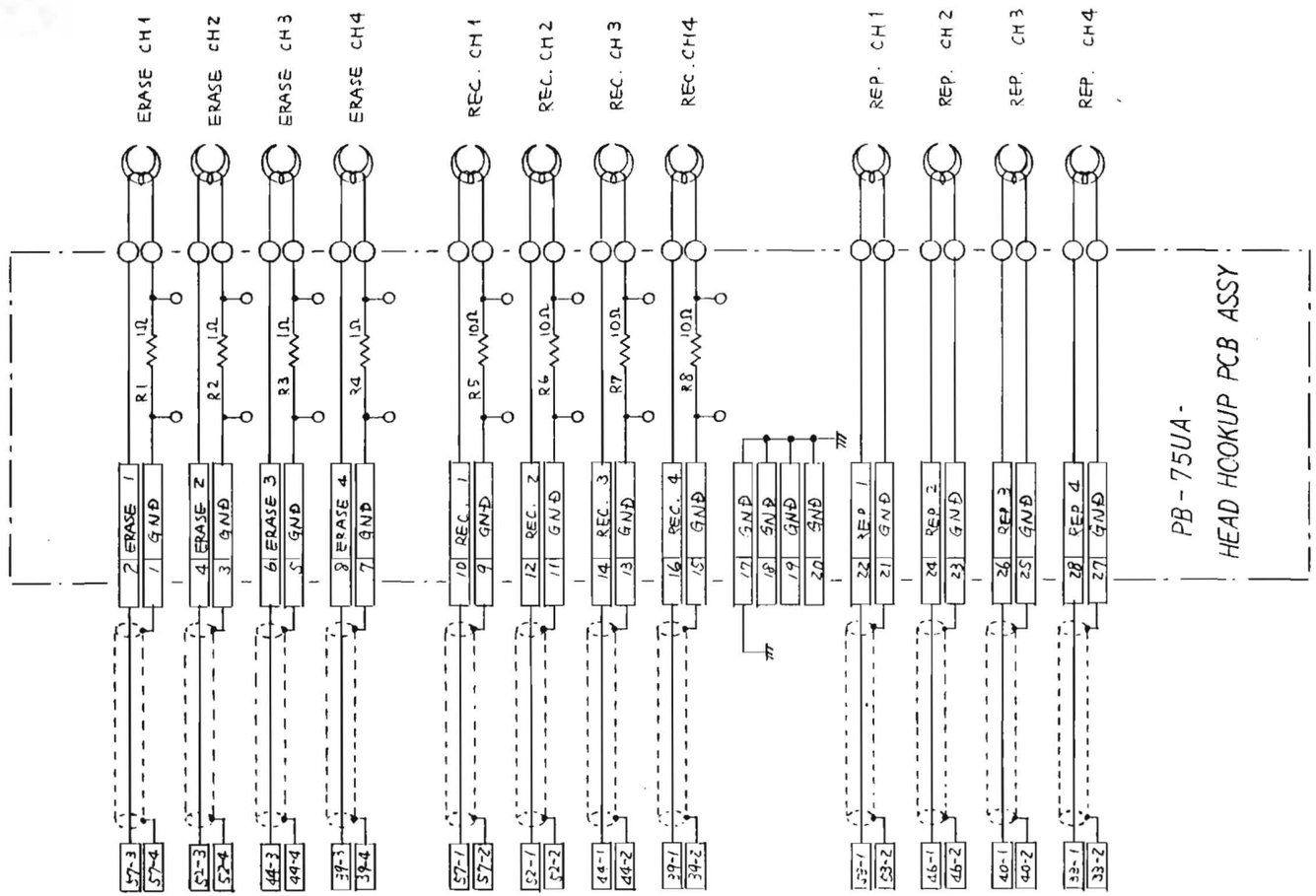
MODEL MTR10-2

DWG. No. 4-28746

3..7811

3..7811

元図	生産図	取説図
3·7811	3-6305	4-28747



TYPE NO(A)TO
( )AT THE END

NOTES : UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS, ¼ W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - *Ⓔ- : ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓜ : MYLAR FILM CAPACITOR (±5%, 50V)
   - Ⓢ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR (±5%)
   - Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
   - Ⓟ : POLYPROPYLENE FILM CAPACITOR (±5%)
   - Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
   - Ⓟ : METALLIZED PAPER CAPACITOR (±10%)
   - ⊣⊢ : SPARK KILLER.
4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO : KH-2J : KH-2M :

MRK	REV. No.	DATE	DWN	APP
⚠7		. .		
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⚠1		. .		

DRAWN	加藤	81.2.25
DESIGNED		. .
CHECKED		. .
APPROVED		. .

OTARI Otari Electric Co,Ltd.

NAME HEAD ASSEMBLY

PART No. KH2J00C

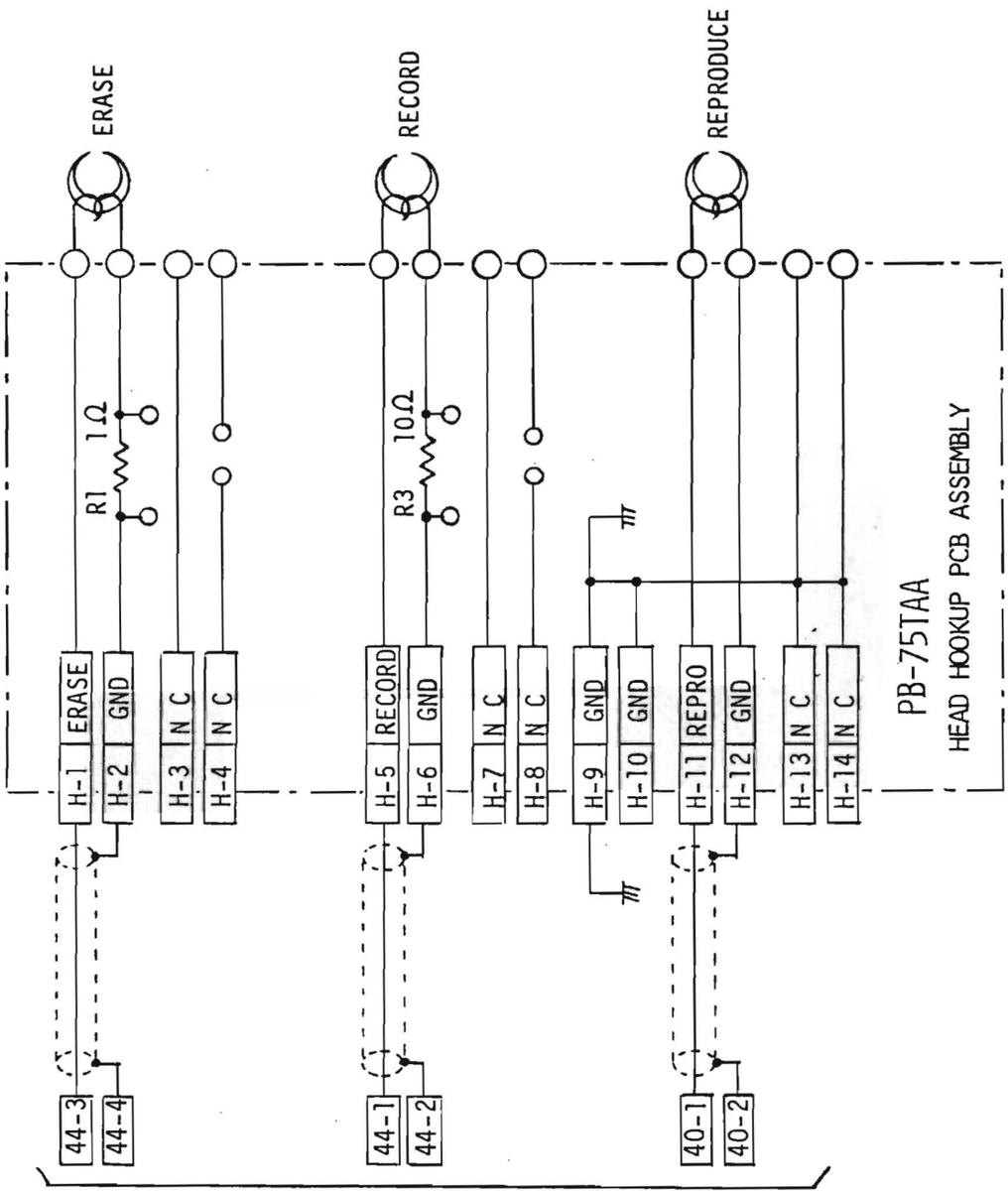
DWG No. 3..7811

02·37 9·79·500

4..28747

元 図	生産図	取説図
4-30534	4-30535	4-30536

MODEL MTR-10



TYPE NO(A)TO
( )AT THE END

THIS SCHEMATIC DIAGRAM IS APPLIED TO | KH-41F | KH-41L

MRK	REV. No.	DATE	DWN	APP
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DRAWN		. .
DESIGNED	マルヤマ	82.3.9
CHECKED	クサマ	82.3.9
APPROVED	コシダ	82.3.9
MATERIAL		
FINISH		

OTARI Otari Electric Co.,Ltd.

NAME: HEAD ASSEMBLY

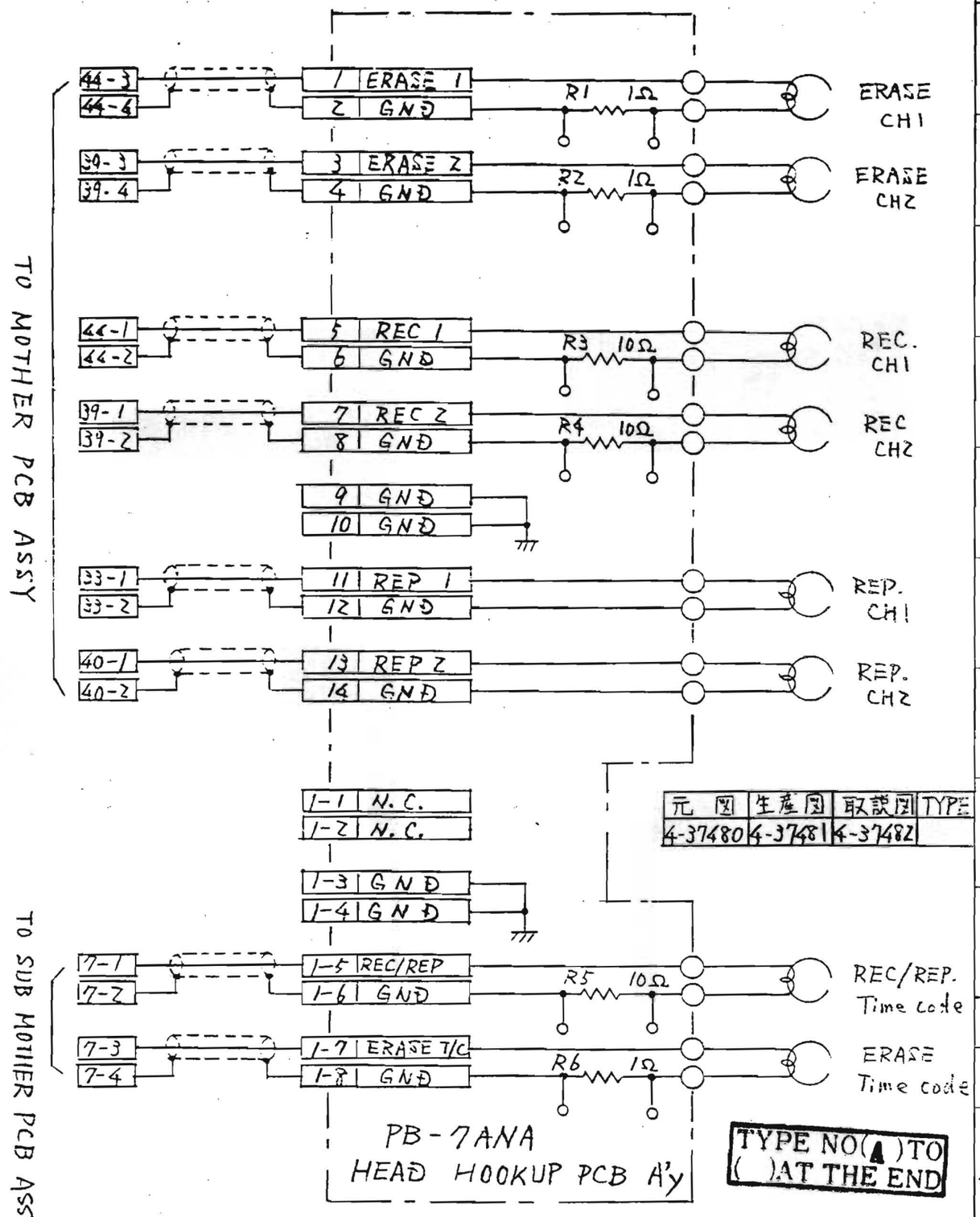
PART No.: KH41F0B

SCALE: X | DIMENSION mm | THIRD ANGLE PROJECTION | SHEET / OF /

DWG. No. 4-30536

1-81-1,000

NO.	DWG. NO.	PART NO.	DESCRIPTION	QTY	REMARKS



元図	生産図	取説図	TYPE
4-37480	4-3748	4-37482	

PB-7ANA
HEAD HOOKUP PCB A'y

TYPE NO(▲)TO
( )AT THE END

MARK	REV. No.	DATE	DWN	APP
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DRAWN	ｲｲﾀﾞ 84.5.10
DESIGNED	〃 . .
CHECKED	ｻｶﾓﾄ 84 5 21
APPROVED	ｺﾞﾄｰﾀﾞ 84 5 21
MATERIAL 材料	
FINISH 処理	

OTARI Otari Electric Co.,Ltd.

NAME 品名 T.C HEAD ASSEMBLY -

PART No. 品番 KH41W0A

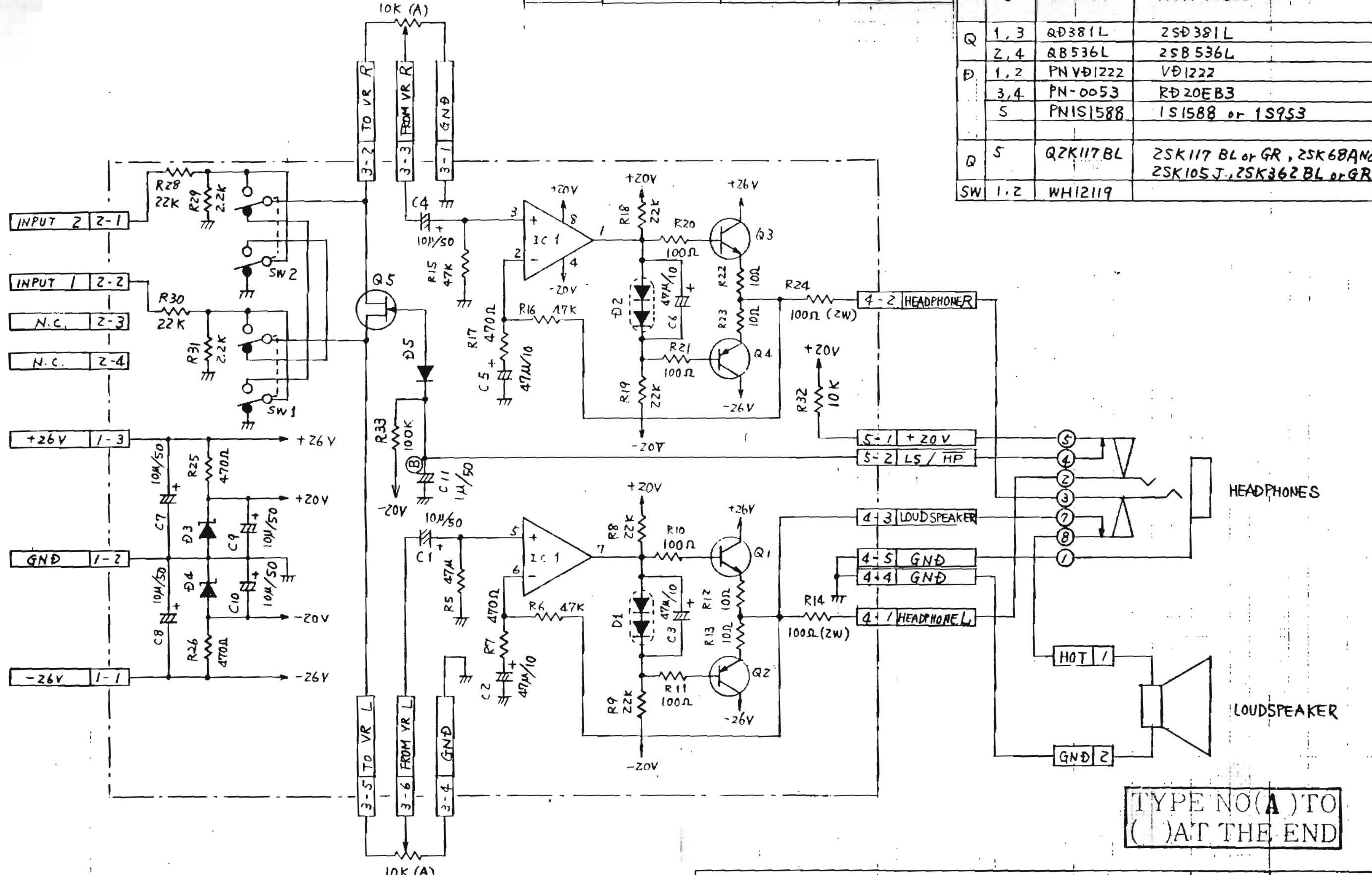
SCALE X | DIMENSION mm | THIRD ANGLE PROJECTION | SHEET 1 OF 1

DWG. No. 4.37482

TYPE	元図	生産図	取説図
A～	3-6304	3-6454	4-39016

Ref. No.		Otari Part No.	Description
IC	1	I-0017	NJM 4560D-X
Q	1, 3	QD381L	2SD381L
	2, 4	QB536L	2SB536L
D	1, 2	PNVD1222	VD1222
	3, 4	PN-0053	RD20EB3
	5	PN1S1588	1S1588 or 1S953
Q	5	Q2K117BL	2SK117 BL or GR, 2SK68A N or M 2SK105 J, 2SK362 BL or GR
SW	1, 2	WH12119	

MODEL MTR10-2



TYPE NO(A)TO
( )AT THE END

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, 1/4 W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
- ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓜ : MYLAR FILM CAPACITOR (±5%, 50V)
- Ⓢ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
- Ⓒ : CERAMIC CAPACITOR.
- Ⓜ : MICA CAPACITOR (±5%)
- Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
- Ⓟ : POLYPROPYLENE FILM CAPACITOR (±5%)
- Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- Ⓜ : METALLIZED PAPER CAPACITOR (±10%)
- ⊣⊢ : SPARK KILLER.

4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO PB-14YA

MRK	REV. No.	DATE	DWN	APP
△		. .		
△		. .		
△		. .		
△		. .		
△		. .		
△		. .		
△		. .		

DRAWN	ﾀﾙﾀﾞ	80.12.1
DESIGNED	ﾀﾙﾀﾞ	. .
CHECKED		. .
APPROVED		. .

OTARI Otari Electric Co.,Ltd.

NAME H.P. AMP. PCB ASSY

PART No. PB14Y0A

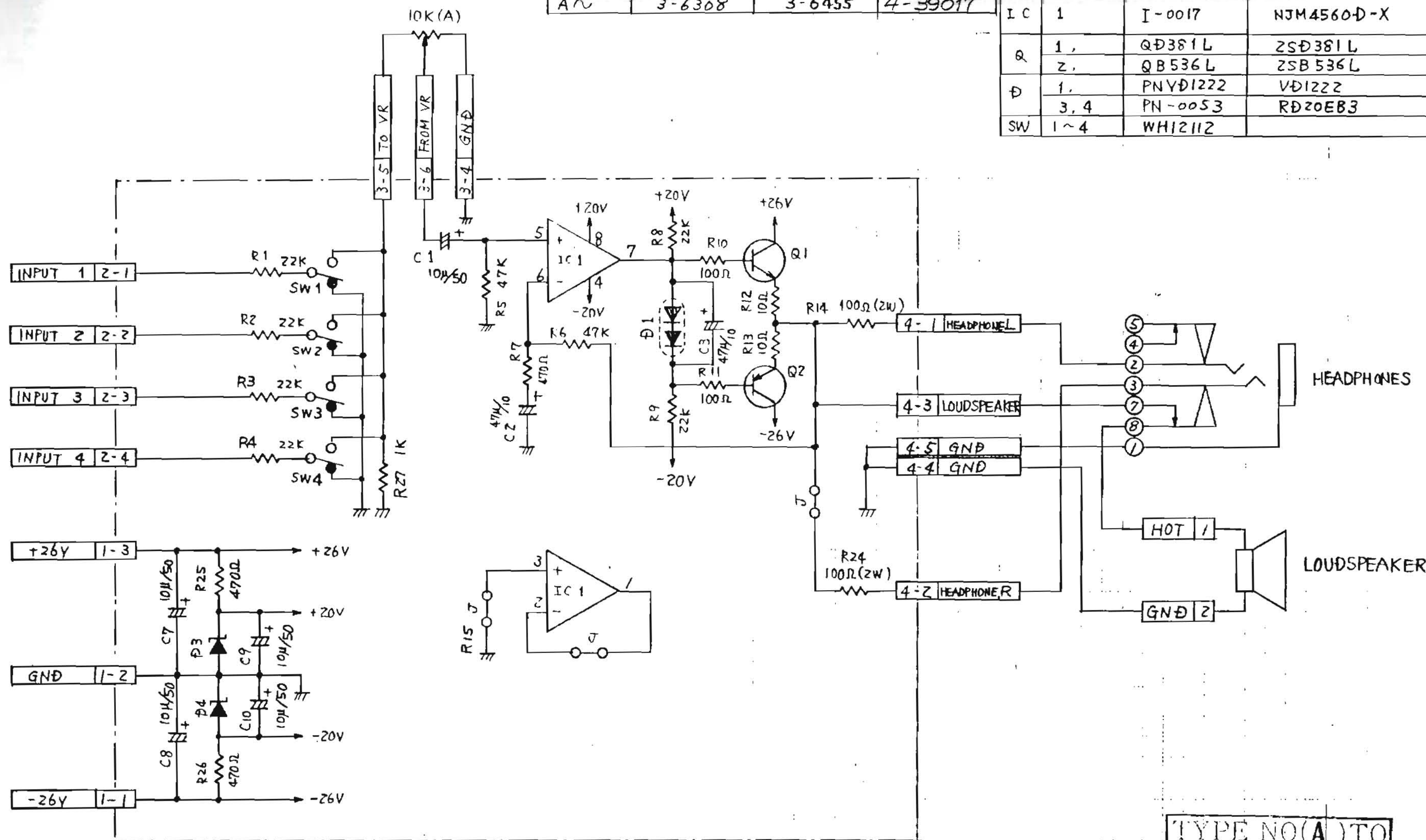
DWG No. 4 .39016

02-37 9-79-500

TYPE	元図	生産図	取説図
A~	3-6308	3-6455	4-39017

Ref	Number	Otari Part No.	Description
IC	1	I-0017	NJM4560D-X
Q	1,	QD381L	2SD381L
	2,	QB536L	2SB536L
D	1,	PNYD1222	VD1222
	3, 4	PN-0053	RD20EB3
SW	1~4	WH12112	

MODEL MTR10-4



TYPE NO(A)TO
( )AT THE END

NOTES : UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS, 1/4 W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓜ : MYLAR FILM CAPACITOR (±5%, 50V)
   - Ⓢ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR (±5%)
   - Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
   - Ⓟ : POLYPROPYLENE FILM CAPACITOR (±5%)
   - Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
   - Ⓟ : METALLIZED PAPER CAPACITOR (±10%)
   - ⊣⊢ : SPARK KILLER.
4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO : PB-15D

MRK	REV. No.	DATE	DWN	APP
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		

DRAWN	ｱﾝﾄﾞｳ	80.12.1
DESIGNED	ｱﾝﾄﾞｳ	. .
CHECKED		. .
APPROVED		. .

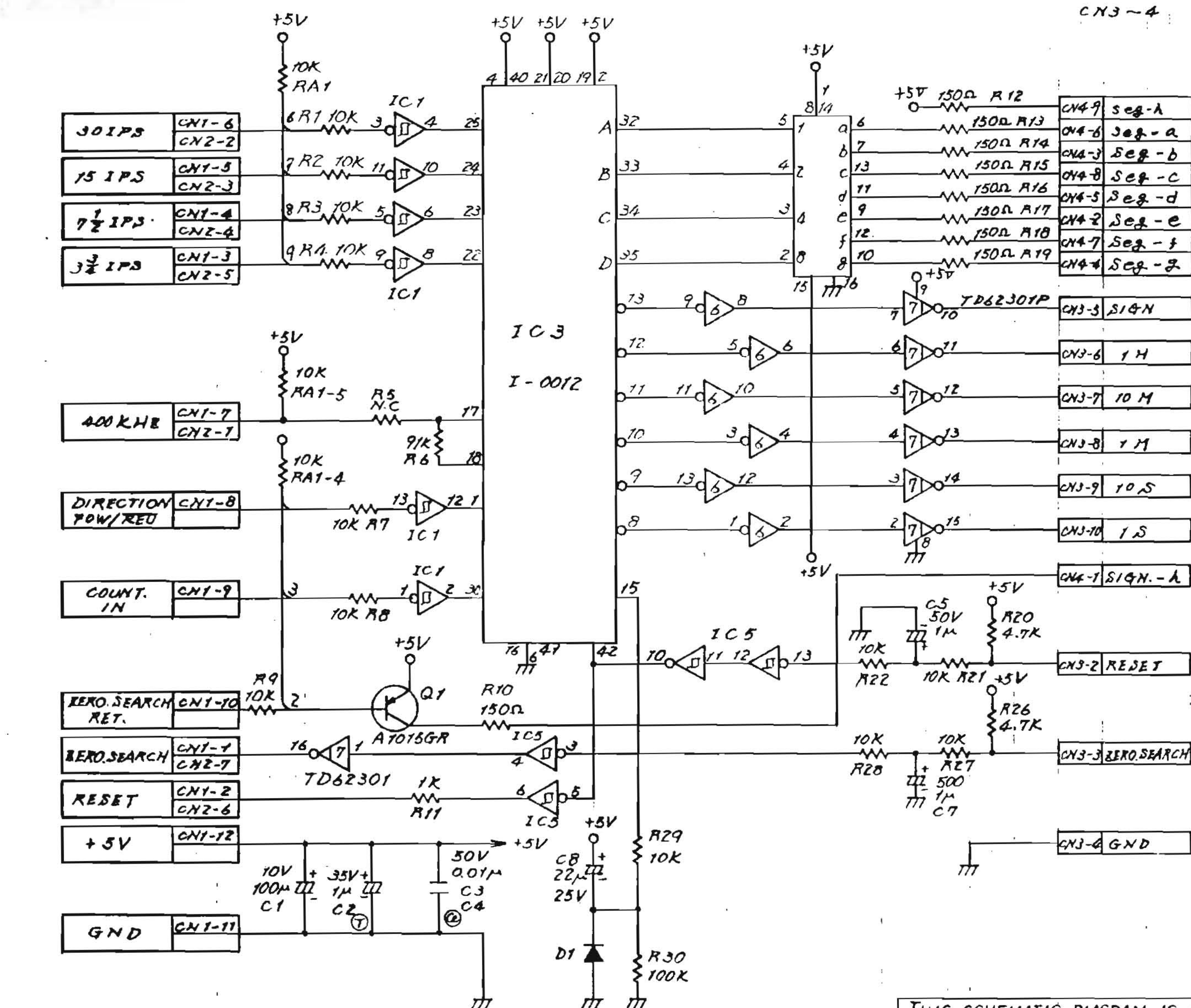
OTARI Otari Electric Co.,Ltd.

NAME H.P. AMPLIFIER PCB ASSY

PART No. PB15D0A

DWG No. 4 . 39017

02 37 9 79 500



REF NUMBER		OTARI PART NUMBER	DESCRIPTION
IC	1, 5	IMC14584	HD14584BP / TC4584BP
IC	2	IMC14013	HD14013BP / TC4013BP
IC	3	I-0012	
IC	4	IMSM561	MSM561RS
IC	6	IMC14069	HD14069BP / TC4069BP / HD14069UBP / TC4069UBP
IC	7	ITD62301	TD62301P
Q	1	QA1015GR	2SA1015GR, BL / 2SA733 L.K
D	1	PNIS1588	1S1588 / 1S953

元図	生産図	取説図	TYPE
3-6578	3-6577	4-39012	A~

TYPE NO(A)TO ( )AT THE END

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
- ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓜ : MYLAR FILM CAPACITOR (±5%, 50V)
- Ⓢ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
- Ⓒ : CERAMIC CAPACITOR.
- Ⓜ : MICA CAPACITOR (±5%)
- Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
- Ⓟ : POLYPROPYLENE FILM CAPACITOR (±5%)
- Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- Ⓟ : METALLIZED PAPER CAPACITOR (±10%)
- SPARK KILLER.

4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO PB-45B

MRK	REV. No.	DATE	DWN	APP

DRAWN	タナカ	81.10.14
DESIGNED	トミヲ	
CHECKED	トミヲ	81.10.28
APPROVED	K.2	81.10.28

OTARI Otari Electric Co.,Ltd.

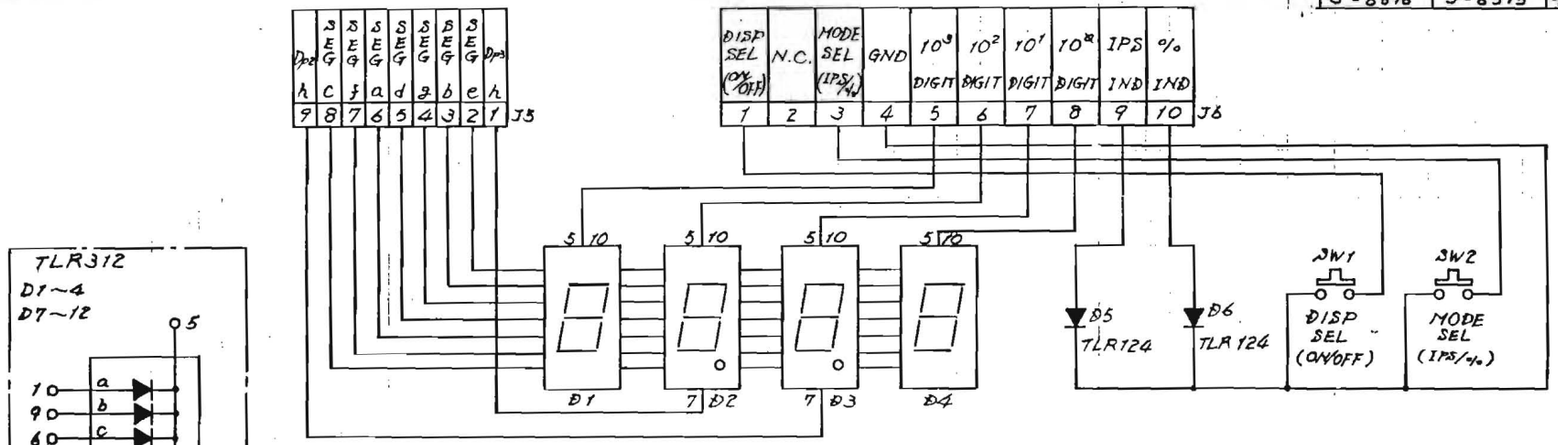
NAME TIMER. DRIVE PCB

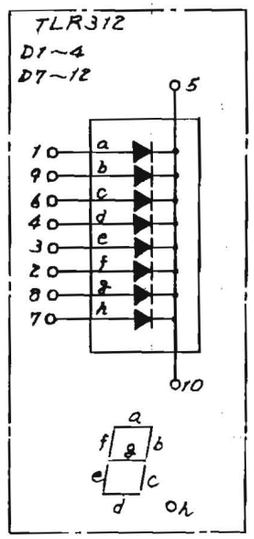
PART No. PB45B0A

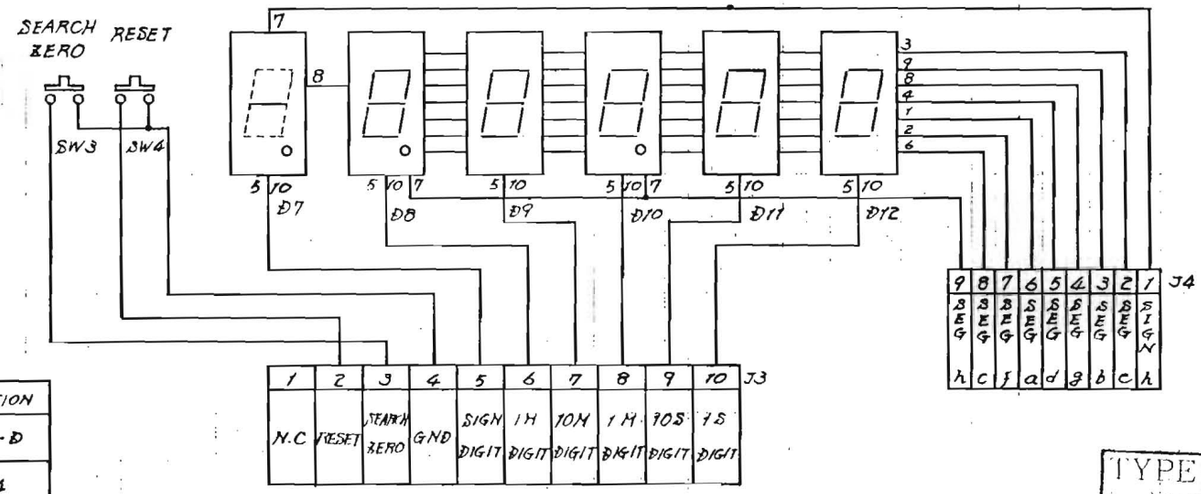
DWG No. 4 .39012

02·37 9·79·500

配線図	部品図	取説図	TYPE
3-6676	3-6575	4-39013	A～







REF.NUMBER	OTARI PART NUMBER	DESCRIPTION
D1～4 D7～12	PN-0153	TLR312-D
D5～6	PNTLR124	TLR124

TYPE NO(A)TO ( )ATTHE END

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS:
   ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   ⊣⊢ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   ⊣⊢ : MYLAR FILM CAPACITOR (±5%, 50V)
   ⊣⊢ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
   ⊣⊢ : CERAMIC CAPACITOR.
   ⊣⊢ : MICA CAPACITOR (±5%)
   ⊣⊢ : TANTALUM ELECTROLYTIC CAPACITOR.
   ⊣⊢ : POLYPROPYLENE FILM CAPACITOR (±5%)
   ⊣⊢ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
   ⊣⊢ : METALLIZED PAPER CAPACITOR (±10%)
   ⊣⊢ : SPARK KILLER.
4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO | PB-82G

MRK	REV. No.	DATE	DWN	APP
7				
6				
5				
4				
3				
2				
1				

DRAWN	[illegible]	87.10.12
DESIGNED	トミタ	
CHECKED	トミタ	87.10.28
APPROVED	K.ITO	87.10.28

OTARI Otari Electric Co,Ltd.

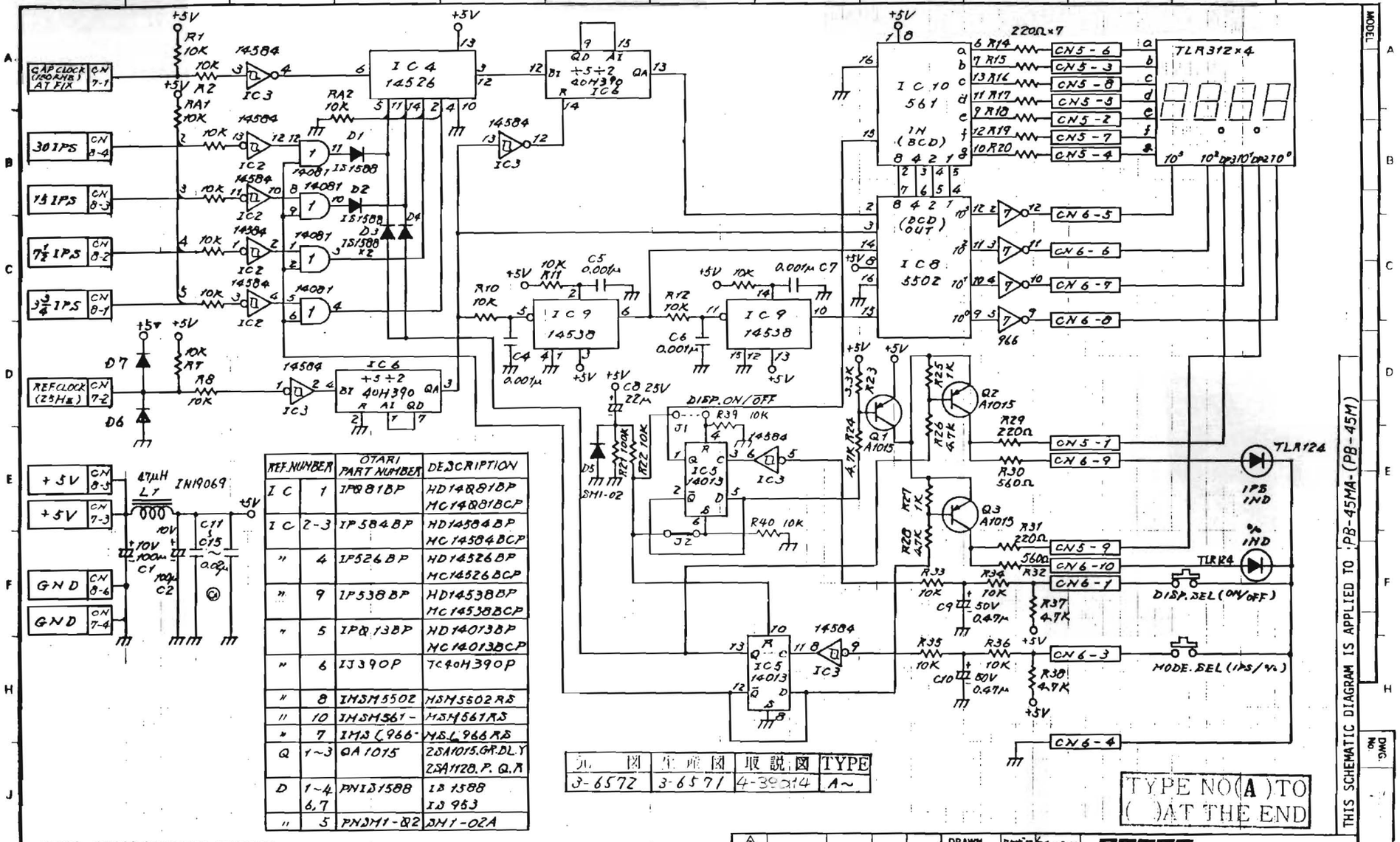
NAME T/MER.DISPLAY PCB

PART No. PB82G0A

DWG No. 4 .39013

DWG. No.

02-37 9 79 500



REF. NUMBER		OTARI PART NUMBER	DESCRIPTION
I C	1	IP0B1BP	HD14B81BP MC14B81BCP
I C	2-3	IP584BP	HD14584BP MC14584BCP
"	4	IP526BP	HD14526BP MC14526BCP
"	9	IP538BP	HD14538BP MC14538BCP
"	5	IP0B13BP	HD14013BP MC14013BCP
"	6	IJ390P	TC40H390P
"	8	IMSM5502	MSM5502RS
"	10	IMSM561-	MSM561RS
"	7	IMSL966-	MSL966RS
Q	1~3	QA1015	2SA1015.GR.BL.Y 2SA1128.P. Q.R
D	1~4 6,7	PNID1588	ID 1588 ID 953
"	5	PNSM1-02	SH1-02A

元 図	実 体 図	取 説 図	TYPE
3-6572	3-6571	4-39014	A~

TYPE NO(A)TO( )AT THE END

THIS SCHEMATIC DIAGRAM IS APPLIED TO : PB-45MA-(PB-45M)

NOTES : UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓜ : MYLAR FILM CAPACITOR (±5%, 50V)
   - Ⓟ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR (±5%)
   - Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
   - Ⓟ : POLYPROPYLENE FILM CAPACITOR (±5%)
   - Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
   - Ⓜ : METALLIZED PAPER CAPACITOR (±10%)
   - ⊣⊢ : SPARK KILLER.
4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

MRK	REV. No.	DATE	DWN	APP
⚠				
⚠				
⚠				
⚠				
⚠				
⚠				
⚠				

DRAWN	[illegible]	81.10.16
DESIGNED	[illegible]	
CHECKED	[illegible]	81.10.28
APPROVED	K.Z.Z	81.10.28

OTARI Otari Electric Co,Ltd.

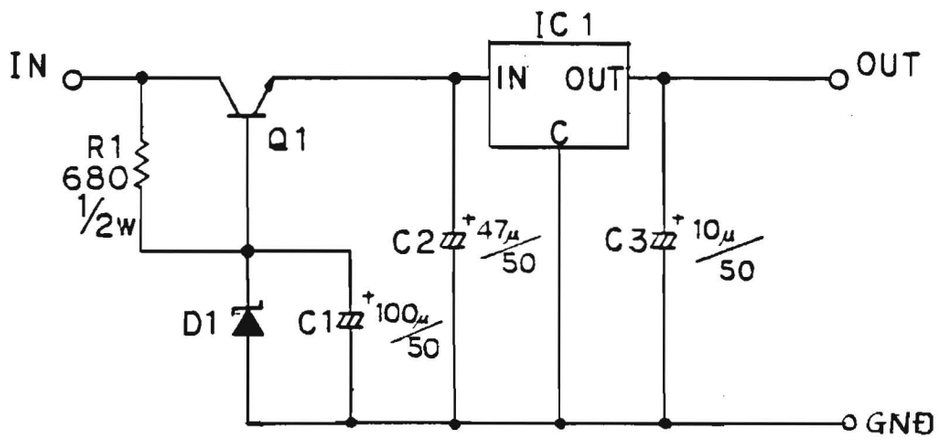
NAME SPD. CALCU. PCB Ass'y

PART No. PB45MQA

DWG No. 4 .39014

02-37 9-79-500

REF. No.		OTARI PART No.	DESCRIPTION
IC	1	IHC7824H	μPC7824H
Q	1	QD1411Y	2SD1411Y
D	1	PN1Z30	1Z30



NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ±W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
: ALUMINUM ELECTROLYTIC CAPACITOR.
: BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
: MYLAR FILM CAPACITOR(±5%, 50V)
: POLYSTYRENE FILM CAPACITOR(±5%, 50V)
: CERAMIC CAPACITOR.
: MICA CAPACITOR(±5%).

: TANTALUM ELECTROLYTIC CAPACITOR.
: POLYPROPYLENE FILM CAPACITOR(±5%)
: LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
: METALLIZED PAPER CAPACITOR(±10%)
: SPARK KILLER.
: SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

TYPE NO(J)TO
( )AT THE END

NAME	HOOK UP PCA
PART No.	PB7UJOA
APPLIED	PB-7UJA

DWN No. 4.45734

REFERENCE NO.	OTARI PART NO.	DESCRIPTION
IC 1	IHC14305	μPC1430SH
IC 2	ITD62301	TD62301P
SW 1~2	WH11118W	11L-120-0000
SW 3	WH11117R	11L-170-0010
SW 4,6,7	WH11117W	11L-170-0000
SW 5	WH11117U	11L-170-0020
D 1	PNTLY206	TLY206
VR 1	RV014026	EWS-MCAS20B14

孔 図	生産図	販売図	TYPE
3-6451	3-6465	4-39019	A~

TYPE NO(**A**)TO
( )AT THE END

48	+8V
49	EXT VARI
50	GND
24	EXT VARI LED
37	SEARCH ZERO LAMP
12	CUE LAMP
7	REC LAMP
8	PLAY LAMP
9	STOP LAMP
10	REWIND LAMP
11	F.FWD LAMP
19	+10V
20	+10V
21	POWER GND
23	LOGIC GND
5	F.FWD SW
4	REWIND SW
3	STOP SW
2	PLAY SW
1	REC SW
6	CUE SW
22	SEARCH ZERO SW

REMOTE CONTROL
PCB Assy
PB-82V

D1 TLY206
VR1 EWS-MCAS20B14
220Ω R9
+5V
RA1 10K
62Ω R3 SEARCH ZERO SW1
62Ω R2 CUE SW2
82Ω R4 REC SW3
62Ω R5 PLAY SW4
62Ω R6 STOP SW5
62Ω R7 REWIND SW6
62Ω R8 F.FWD SW7
36Ω 2W R1
IC 1 μPC14305 IN OUT COM +5V
C1 100μ/25V
C2 0.47μ/50V
C3 100μ/25V

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
- ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
- Ⓜ : MYLAR FILM CAPACITOR (±5%, 50V)
- Ⓟ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
- Ⓒ : CERAMIC CAPACITOR.
- Ⓜ : MICA CAPACITOR (±5%)

- Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
- Ⓟ : POLYPROPYLENE FILM CAPACITOR (±5%)
- Ⓛ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- Ⓜ : METALLIZED PAPER CAPACITOR (±10%)
- ⊣⊢ : SPARK KILLER.

4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO : CB-111

MRK	REV. No.	DATE	DWN	APP
7				
6				
5				
4				
3				
2				
1				

DRAWN	ITO	81.5.18
DESIGNED		
CHECKED	ナルヤ	81.5.18
APPROVED		

OTARI Otari Electric Co.,Ltd.

NAME REMOTE CONTROL BOX

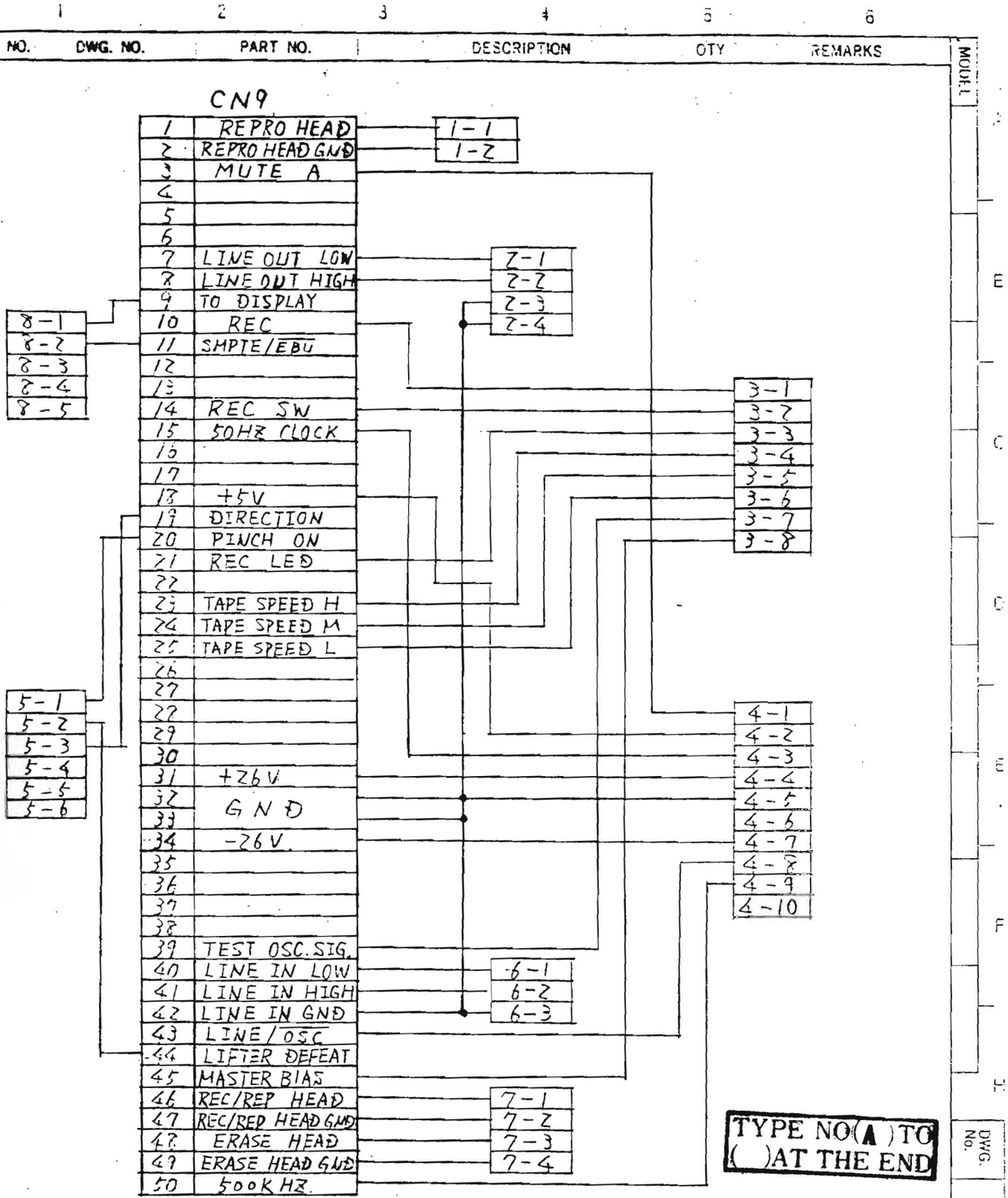
PART No. CB1110B

DWG No. 4 .39019

MODEL

DWG NO.

02-37 9-79-500



TYPE NO(A) TO ( )AT THE END

4-37628	4-37629	4-37630	A~
元図	生産図	取説図	TYPE

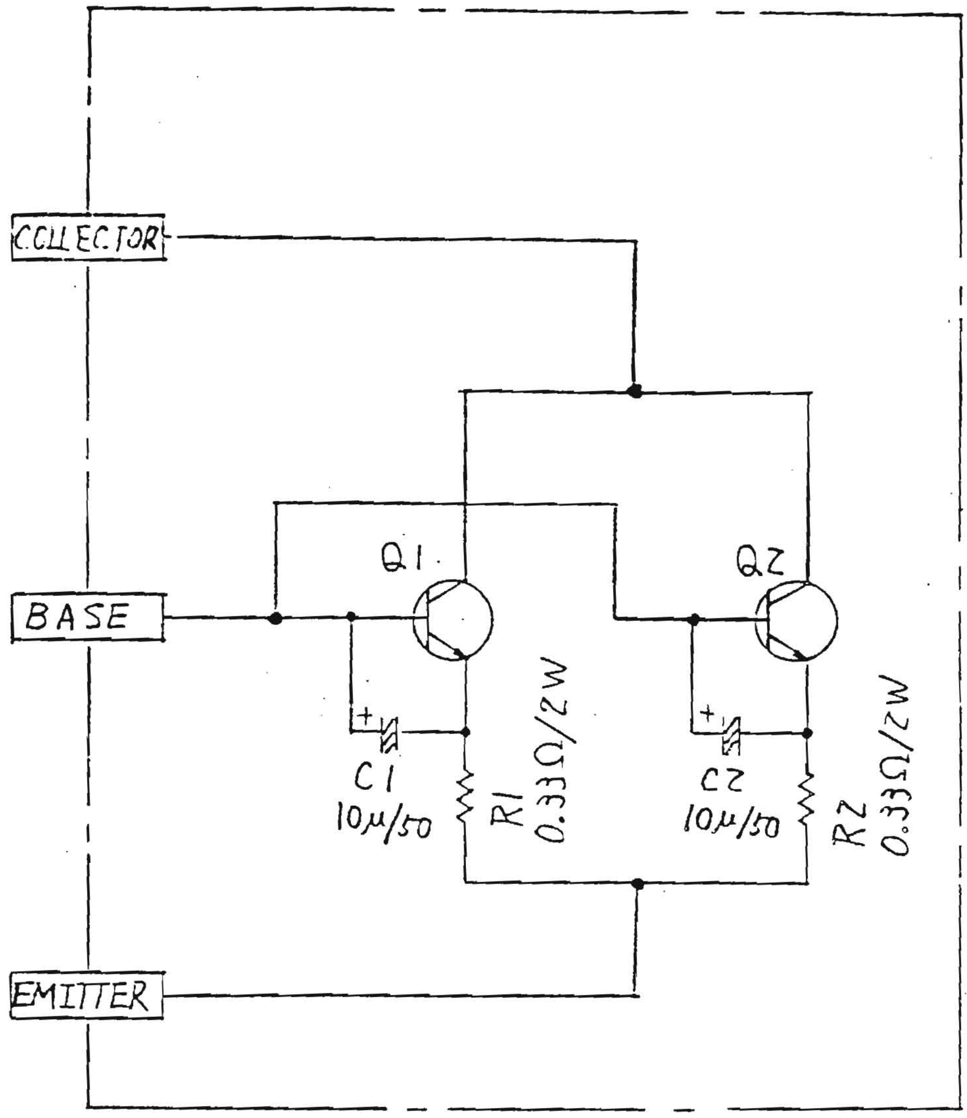
MRK	REV. No.	DATE	DWN	APP
7		. .		
6		. .		
5		. .		
4		. .		
3		. .		
2		. .		
1		. .		

DRAWN イイダ 84.5.17
DESIGNED 〃 . .
CHECKED マルヤマ 84. 5.18
APPROVED ゴトー 84. 5.21
MATERIAL 材料
FINISH 処理

OTARI Otari Electric Co.,Ltd.
NAME 品名 SUB MOTHER PCB A'y
PART No. 品番 PB7960A
SCALE /
DIMENSION mm
THIRD ANGLE PROJECTION
SHEET
OF

DWG. No. 4.37630

NO.	DWG. NO.	PART NO.	DESCRIPTION	QTY	REMARKS



REF. NO.	OTARI PART NO.	DESCRIPTION
Q1, 2	QC32810	2SC32810

TYPE NO(▲)TO ( )AT THE END

元図	生産図	取説図	TYPE
4-37622	4-37623	4-37624	M

MRK	REV. No.	DATE	DWN	APP
7		. .		
6		. .		
5		. .		
4		. .		
3		. .		
2		. .		
1		. .		

DRAWN	ルイゴ 84.5.17
DESIGNED	〃
CHECKED	ツルタ 84.5.19
APPROVED	シミズ 84.5.21
MATERIAL 材料	
FINISH 処理	

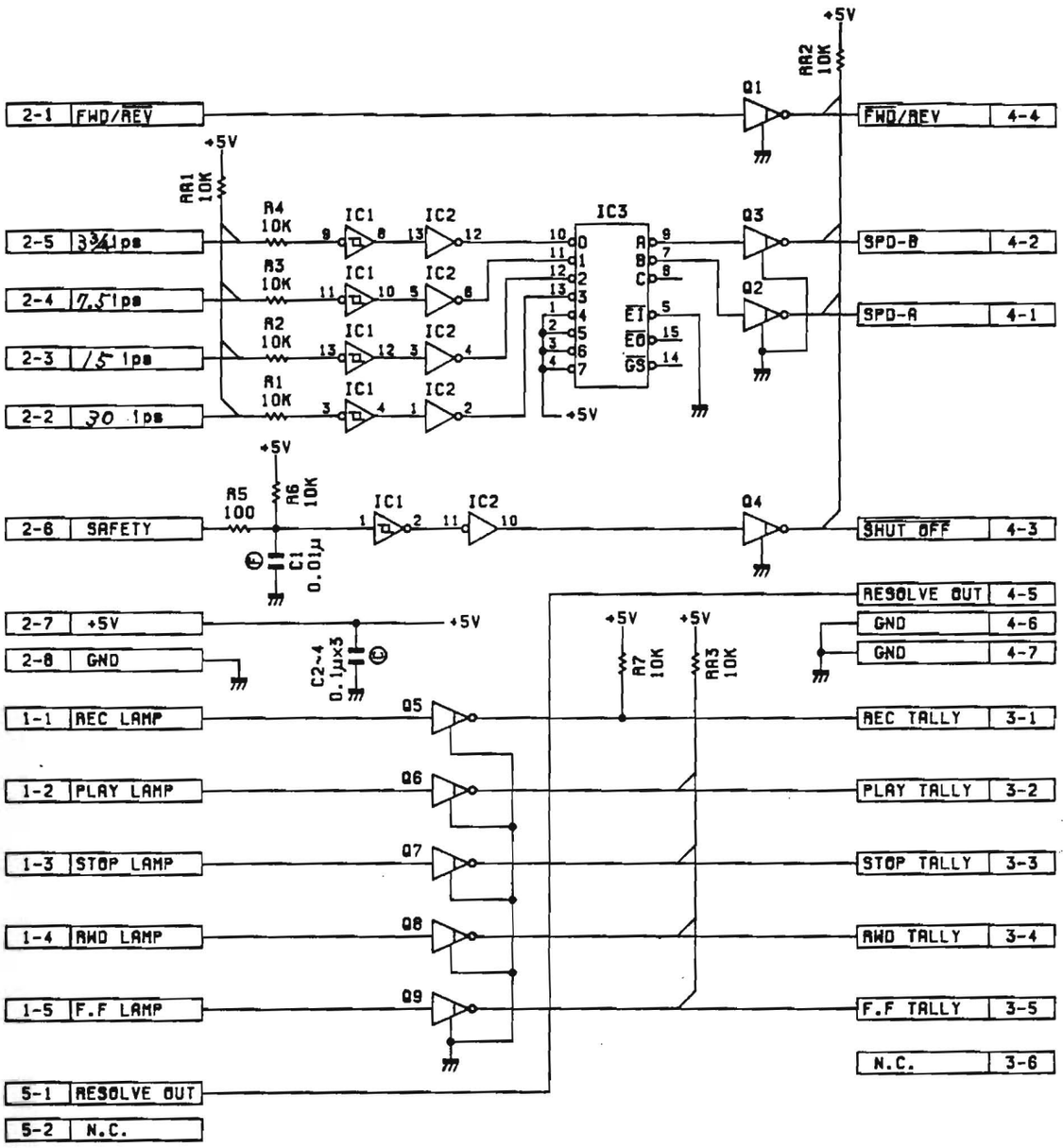
OTARI Otari Electric Co.,Ltd.

NAME 品名 Tr Hookup PCB Ass'y

PART No. 品番 PB7AF0A

SCALE / | DIMENSION mm | THIRD ANGLE PROJECTION | SHEET OF

DWG. No. 4 37624



REF. NO.		ATARI PART NO.	DESCRIPTION
IC	1	IMC14584	MC14584
	2	IMC14069	MC14069
	3	IALS148N	SN74LS148N
Q	1~9	Q-0010	UN1213

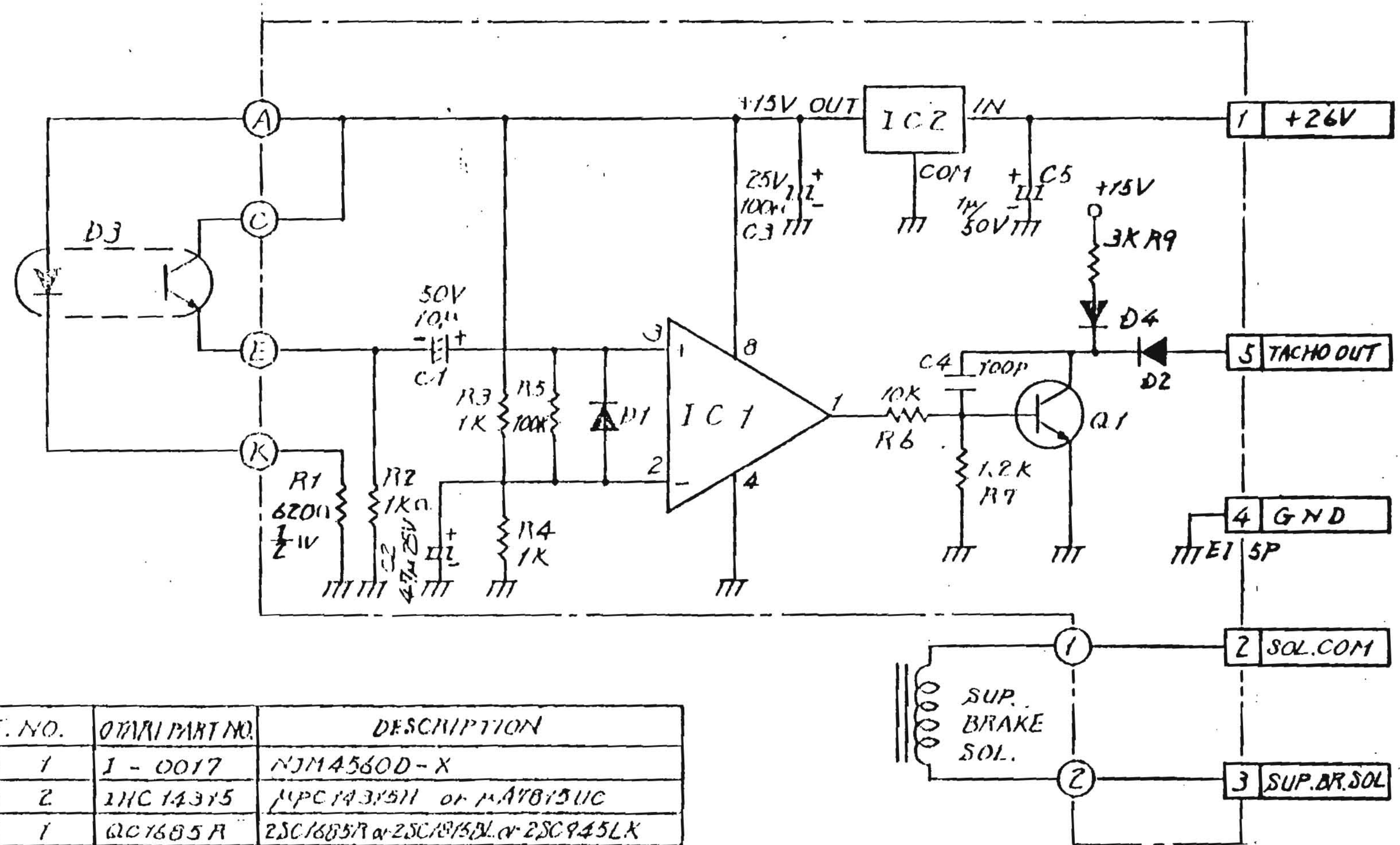
TYPE NO(A)TO
( )AT THE END

NAME	I/O HOOK UP PCA
PART NO.	PB7CD0A
APPLIED	PB-7CDA

DWG. NO. 4 . 39695

元図	生産図	取説図	TYPE
4-29235	4-29234	4-27705	A～

THIS SCHEMATIC DIAGRAM IS APPLIED TO: PB-44Y



REF. NO.		OTARI PART NO.	DESCRIPTION
IC	1	1-0017	NJM4560D-X
	2	1HC 14315	μPC14315H or μA7815UC
Q	1	QC1685R	2SC1685R or 2SC1815BL or 2SC945LK
D	1, 2	PN1S1588	1S1588 or 1S953
	4	PN7LR124	TLR124
	3	PN-0145	EESG3-F1B

TYPE NO(A')TO ( )AT THE END

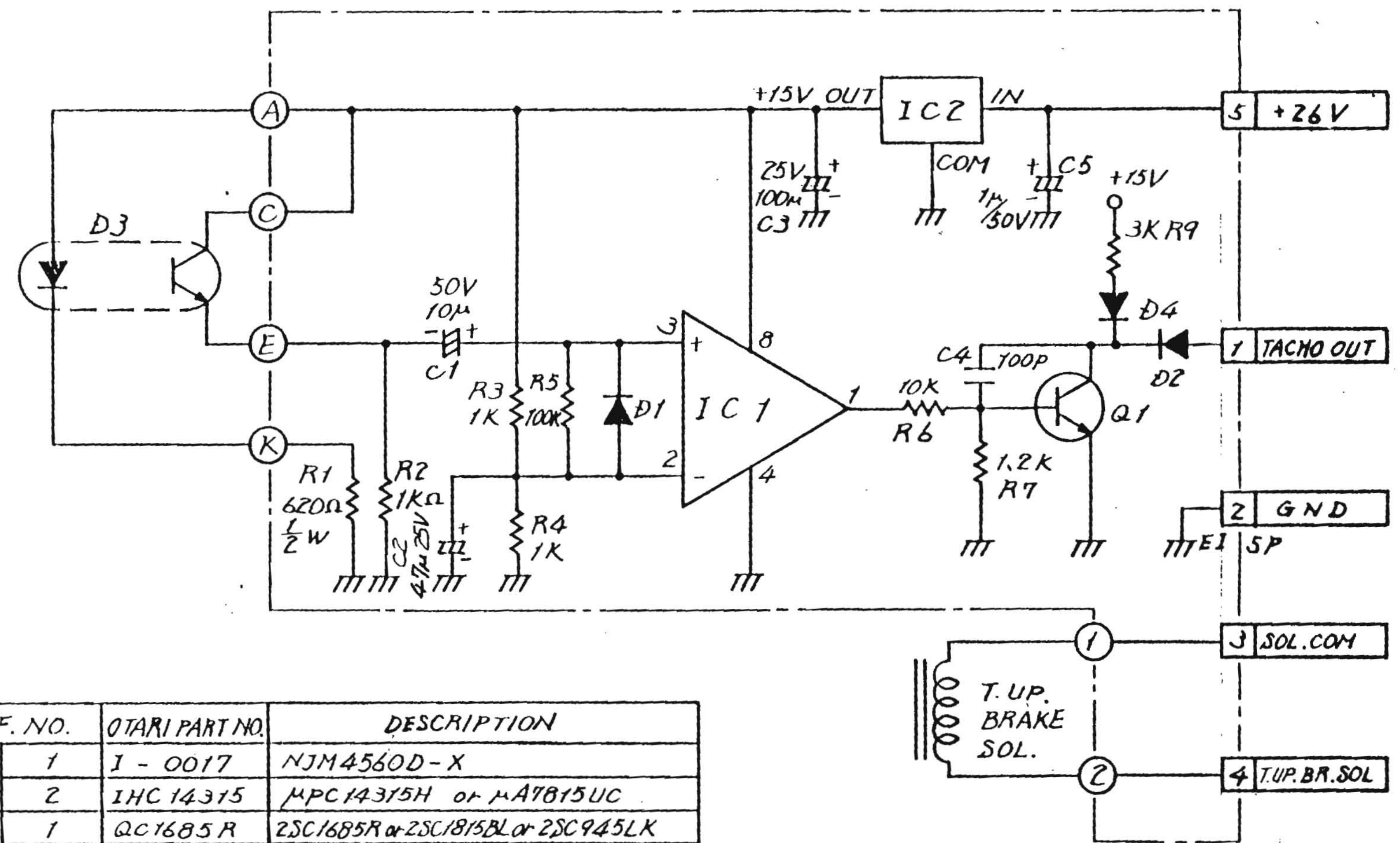
DRAWN	
DESIGNED	
CHECKED	81.10.28
APPROVED	81.10.28
MATERIAL	
FINISH	
NAME	SUP REEL TACH PCB ASS'Y
PART No.	PB44YCA
SCALE	/
DIMENSION	
SHEET	1 OF 1

NON THIRD ANGLE PROJECTION

Otari Electric Co.,Ltd.

DWG No. 4 27705

元図	生産図	取説図	TYPE
4-29233	4-29232	4-27706	A ~



THIS SCHEMATIC DIAGRAM IS APPLIED TO PB-44Z

REF. NO.		OTARI PART NO.	DESCRIPTION
IC	1	I - 0017	NJM4560D-X
	2	IHC14315	μPC14315H or μA7815UC
Q	1	QC1685R	2SC1685R or 2SC1815BL or 2SC945LK
D	1, 2	PN1S1588	1S1588 or 1S953
	4	PNTLR124	TLR124
	3	PN-0145	EESG3-F1B

TYPE NO(A)TO ( )AT THE END

OTARI Otari Electric Co.,Ltd.

NAME: T.UP. REEL TACH PCB Ass'y

PART No.: PB44Z0A

SCALE: NON — THIRD ANGLE PROJECTION — SHEET 1 OF 1

DWG. No. 4-27706

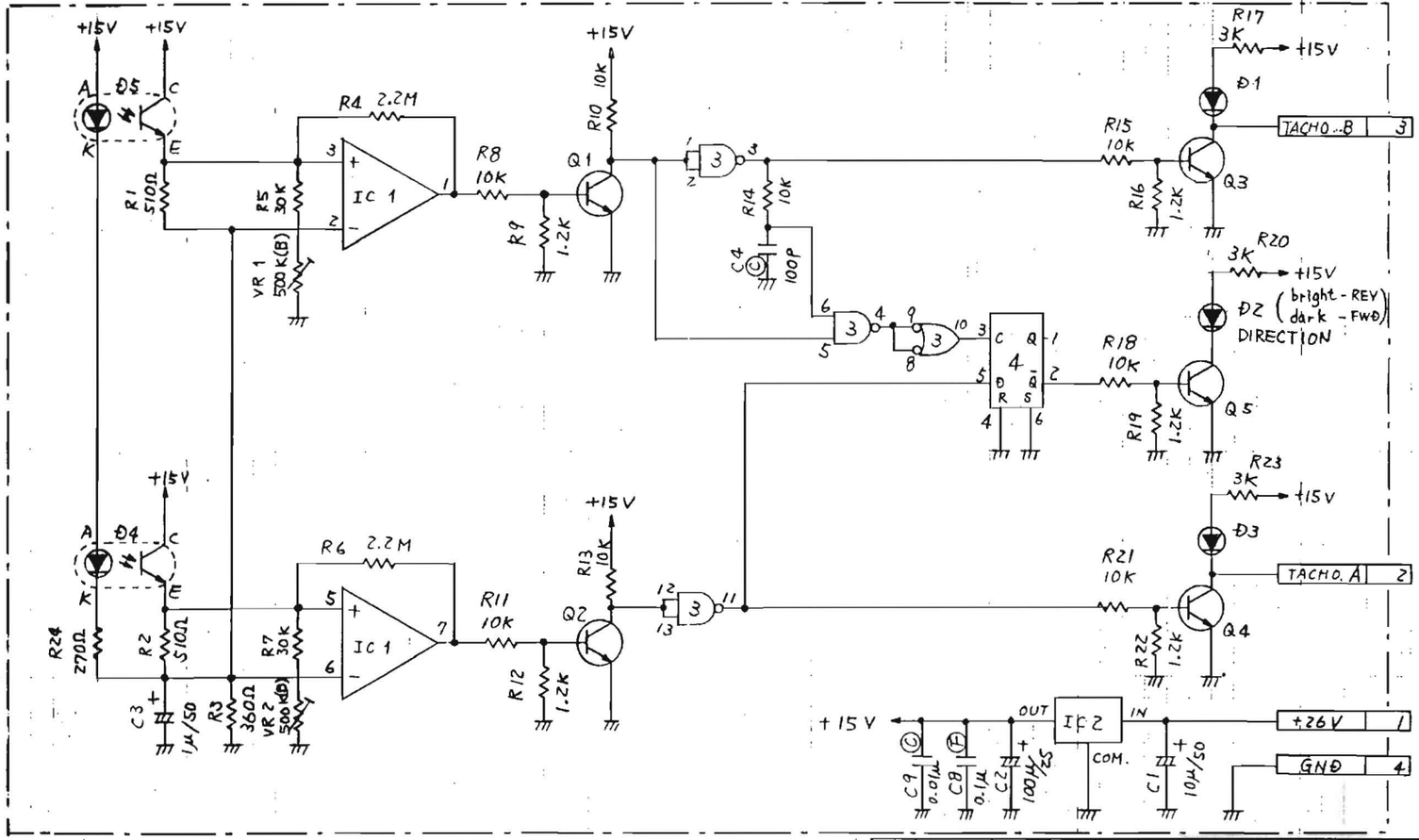
REF. No.		OTARI PART No	DESCRIPTION
IC	1	I-0017	NJM4560D-X
	2	IHC78M15	μPC78M15H or μA7815UC
	3	IMC14093	MC14093B
	4	IMC14013	MC14013B
Q	1~4	QC1815BL	2SC1815BL or GR, 2SC945OK or P, 2SC2320F

REF. No.		OTARI PART No.	DESCRIPTION
D	1,3	PNTLR124	TLR124 (RED)
	2	PNTLG124	TLG124 (GREEN)
	4,5	PN-0145	EESG3-F1B

元図	生産図	取説図	TYPE
3-6621	3-6622	4-39015	A~

MODEL MTR-10-2 MTR-10-4

TYPE NO(A)TO ( )AT THE END



NOTES : UNLESS OTHERWISE SPECIFIED

1. RESISTANCE VALUES ARE IN OHMS, ¼ W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣⊢ : ALUMINUM ELECTROLYTIC CAPACITOR.
   - ⊣⊢ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - ⊣⊢ : MYLAR FILM CAPACITOR (±5%, 50V)
   - ⊣⊢ : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
   - ⊣⊢ : CERAMIC CAPACITOR.
   - ⊣⊢ : MICA CAPACITOR (±5%)
   - Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
   - Ⓟ : POLYPROPYLENE FILM CAPACITOR (±5%)
   - Ⓒ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
   - Ⓜ : METALLIZED PAPER CAPACITOR (±10%)
   - ⊣⊢ : SPARK KILLER.
4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

This schematic diagram is applied to PB-45A

MRK	REV. No.	DATE	DWN	APP
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		
⚠		. .		

DRAWN	マルヤマ	81.7.9
DESIGNED	マルヤマ	81.6.1
CHECKED	トミヤマ	81.7.9
APPROVED		. .

OTARI Otari Electric Co,Ltd.

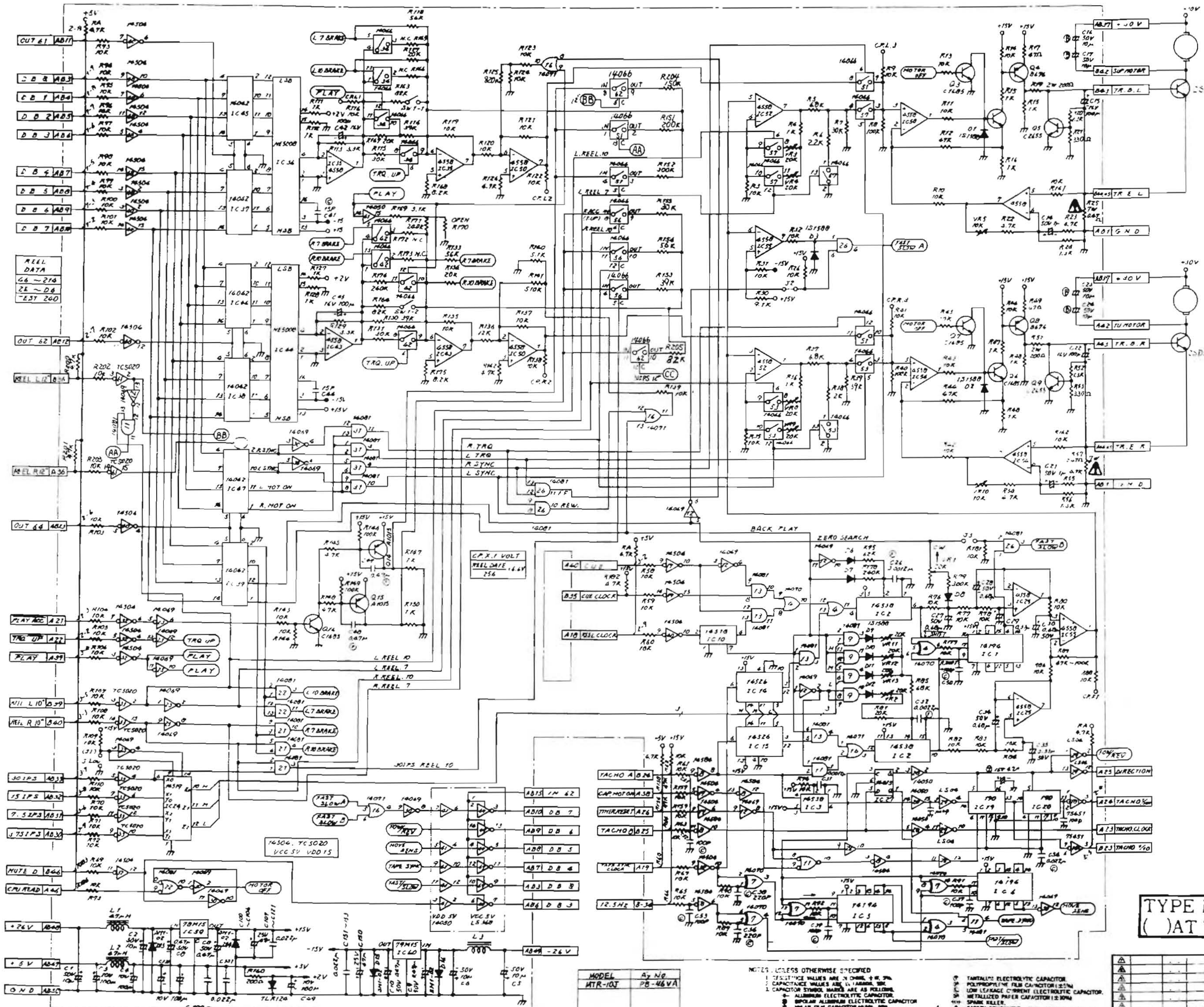
NAME ROLLER TACH PCB ASSY

PART No. PB45A0A

DWG No. 4-39015

DWG. NO.

02 37 9-79 500



REF NO.		OTARI PART NO.	DESCRIPTION
IC	1 5 6	1MC 14194	MC 14194BCP or HD14194BP, TC4194BP
	2 3	1MC 14538	MC 14538BCP or HD14538BP
	4 7	1MC 14070	MC 14070BCP or HD14070BP
	8	1MC 14594	MC 14584BCP or HD14584BP
	9.11.13.21 22.26.31	1MC 14081	MC 14081BCP or HD14081BP
	10	1MC 14518	MC 14518BCP or HD14518BP
	12 23 30	1MC 14069	MC 14069BCP or HD14069BP
	14.15	1MC 14526	MC 14526BCP or HD14526BP
	16	1MC 14071	MC 14071BCP or HD14071BP
	17.32.40.68	1MC 14506	MC 14506BCP
	18	1G 75451	SN75451BP or HD75451BP
	19.20	1A 1904	SN76 1904 or HD76 1904
	24	1MC 14519	MC 14519BCP or HD14519BP
	25.35.43.50 52.54.55.58	1MC 4558	μPC4558C or NJM4558 AN6552
	27	1MC 14013	MC 14013BCP or HD14013BP
	28.61	1MC 14050	MC 14050BCP or HD14050BP
	29	1ALS14N	SN74LS14N or HD74LS14N
	33 41	1TC 5020B	TC5020BP
	34 42 51.53 56 57.62	1M 14066	MC 14066BCP or HD14066BP TC 4016BCP or HD14016BP
	36.46	1-NE 5088	NE5088N or MC1408-8
	37 38 39 45 46 47	1MC 14042	MC 14042BCP or HD14042BP
	49	1ALS 368N	SN74LS368N or HD74LS368N
	59	1MC 78M15	μPC78M15H or MC78M15
	60	1MC 79M15	μPC79M15H or MC79M15
Q	2 3 5 7 14	QC 1685R	2SC1685 R or S 2SC1815 3L or GR,Y 2SC945 LK or P
	6 8	QB 676Y	2SB676 Y or O
	5 9	QC 2655Y	2SC2655 Y or O
	10 15	QA1015GR	2SA1015GR or BL
D	1 2 3 4 5 7 8 9 10 11.12	PN1S 1588	1S1588 or 1S953 1N4148, 1N4448
	13 14 15 16	PNSM1-02	SM1-402 or IN4003

NOTE

	PB-46V
J1	OPEN
J2	OPEN
J3	OPEN

- 22.5

MODEL	Ay No
MTR-10J	PB-46VA

NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ± 1/4W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
- ALUMINUM ELECTROLYTIC CAPACITOR.
- BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR
- MYLAR FILM CAPACITOR (±5%, 50V)
- POLYSTYRENE FILM CAPACITOR (±5%, 50V)
- CERAMIC CAPACITOR.
- MICA CAPACITOR (±5%)
- TANTALUM ELECTROLYTIC CAPACITOR.
- POLYPROPYLENE FILM CAPACITOR (±5%)
- LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- METALLIZED PAPER CAPACITOR (±10%)
- SPARK KILLER.

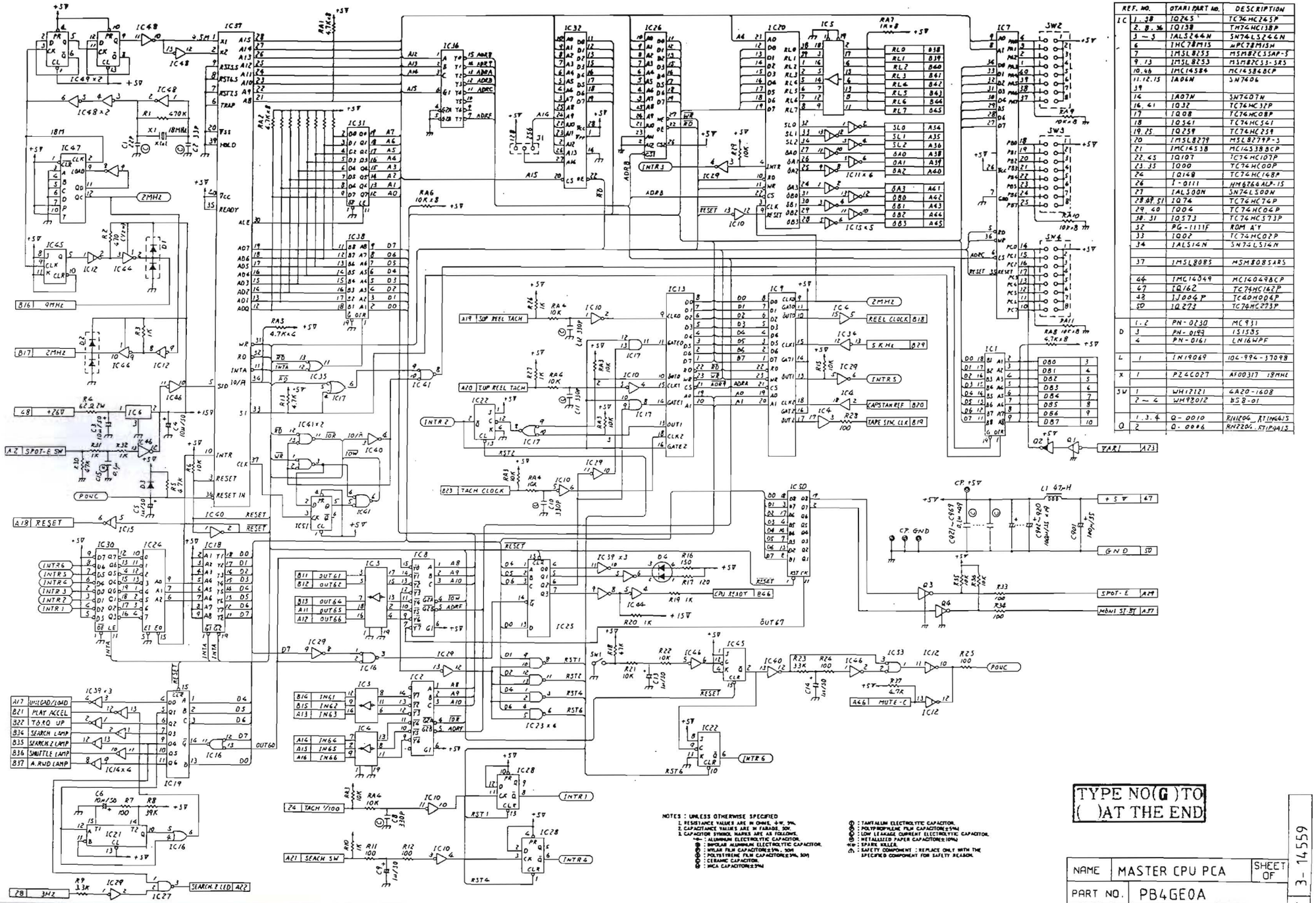
4. ⚠ SAFETY COMPONENT. REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

TYPE NO(A)TO
( )AT THE END

OTARI Otari Electric Co.,Ltd.
NAME REEL.CONT.PCB ASSY
PART No. PB-46V0A
DWG No.
MRK | REV. No. | DATE

10161

MTR-10J



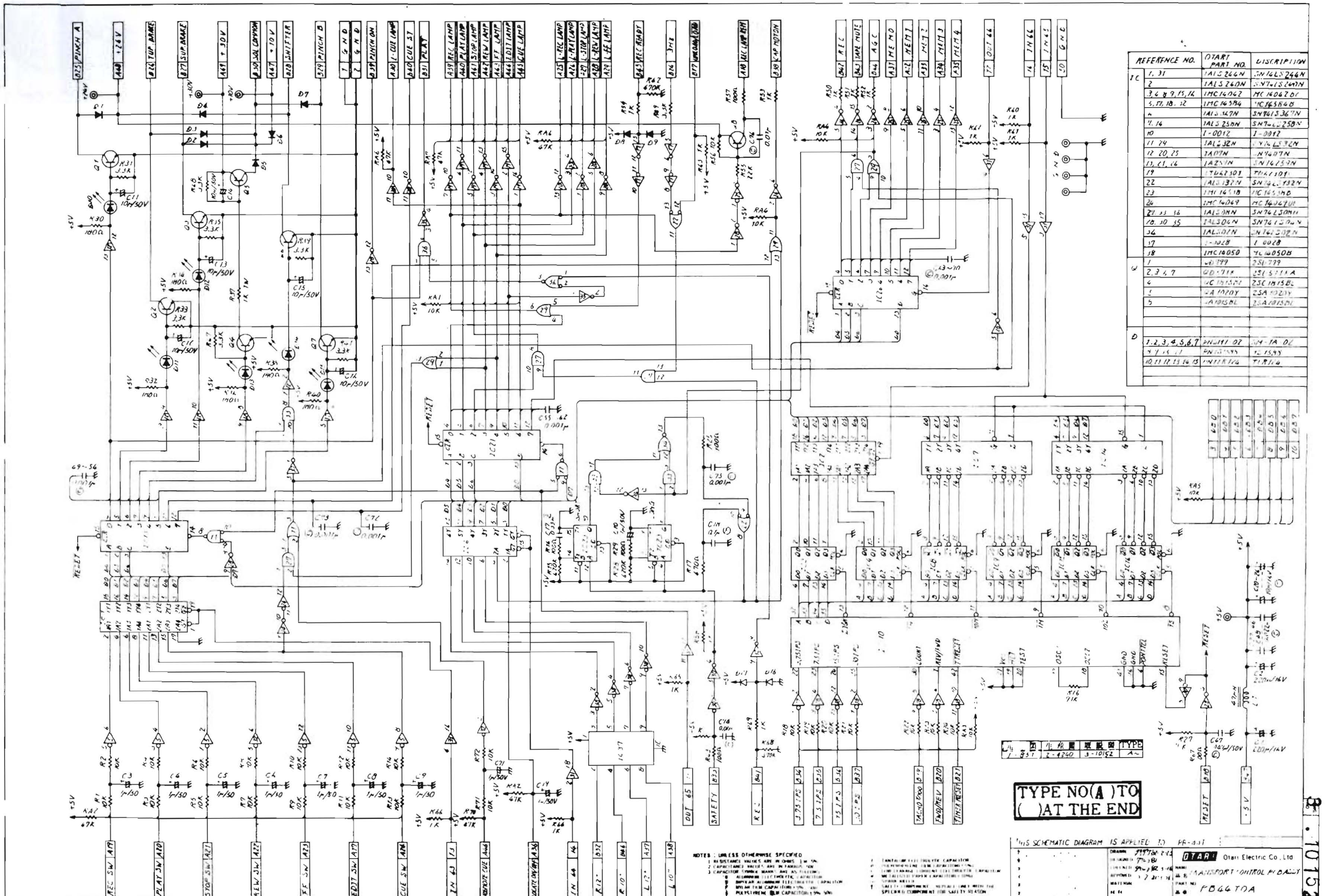
REF. NO.		OTARI PART NO.	DESCRIPTION
IC	1, 38	10245	TC74HC245P
	2, 8, 36	10138	TM74HC138P
	3 – 5	7ALS244N	SN74LS244N
	6	1HC78M15	μPC78M15H
	7	1MSL8255	MSM82C55AP-5
	9, 13	1MSL8253	MSM82C53-5RS
	10, 46	1MC14584	MC14584BCP
	11, 12, 15	7A04N	SN7404
	39		
	16	7A07N	SN7407N
	16, 41	1032	TC74HC32P
	17	1008	TC74HC08P
	18	10541	TC74HC541
	19, 25	10259	TC74HC259
	20	1MSL8279	MSL82799P-5
	21	1MC14538	MC14538BCP
	22, 45	10107	TC74HC107P
	23, 35	1000	TC74HC00P
	24	10148	TC74HC148P
	26	1-0111	HM6766ALP-15
	27	1AL500N	SN74LS00N
	28, 29, 51	1074	TC74HC74P
	29, 40	1004	TC74HC04P
	30, 31	10373	TC74HC573P
	32	PG-1111F	ROM ASY
	33	1002	TC74HC02P
	34	7ALS14N	SN74LS14N
	37	1MSL8085	MSM8085ARS
	44	1MC14049	MC14049BCP
	47	10162	TC74HC162P
	48	1J004P	TC40H004P
	50	10273	TC74HC273P
D	1, 2	PN-0230	MC931
	3	PN-0199	151535
	4	PN-0161	LN16WPF
L	1	1N19069	104-994-37098
X	1	PZ4C027	AF00317 18MHz
SW	1	WH17121	6A20-1608
	2 – 4	WH97012	BS8-01
Q	1, 3, 4	Q-0010	RN1104, RT1P104LS
	2	Q-0086	RN2204, ST1P04LS

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%
2. CAPACITANCE VALUES ARE IN FARADS, 50V
3. CAPACITOR SYMBOL NAMES ARE AS FOLLOWS.
+ : ALUMINUM ELECTROLYTIC CAPACITOR.
: BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
: MYLAR FILM CAPACITOR(±5% , 50V)
: POLYSTYRENE FILM CAPACITOR(±5%, 50V)
: CERAMIC CAPACITOR.
: MICA CAPACITOR(±5%)

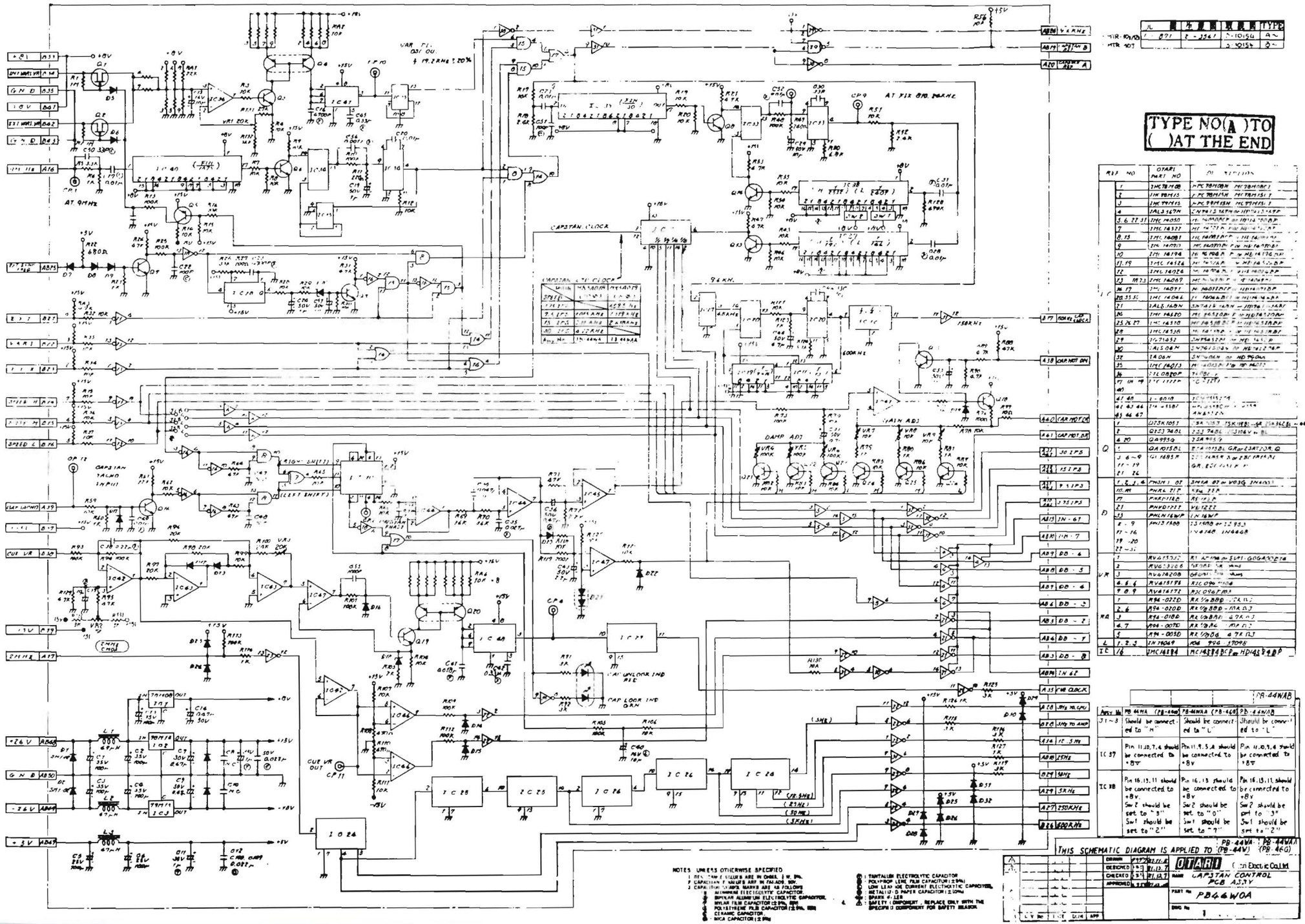
: TANTALUM ELECTROLYTIC CAPACITOR.
: POLYPROPYLENE FILM CAPACITOR(±5%)
: LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
: METALLIZED PAPER CAPACITOR(±10%)
: SPARK KILLER.
: SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

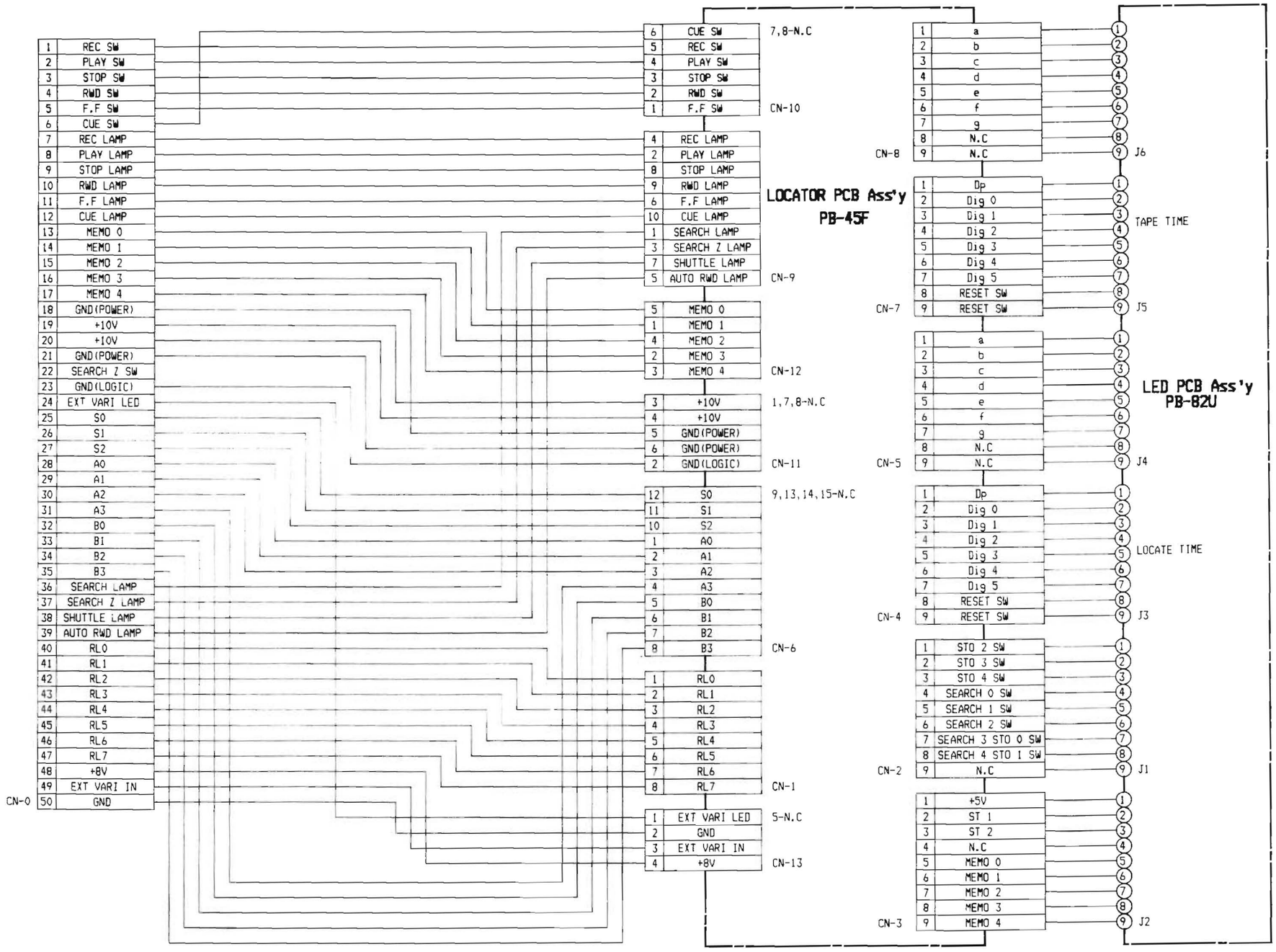
TYPE NO(G)TO
( )AT THE END

NAME	MASTER CPU PCA	SHEET OF	3-14559
PART NO.	PB4GE0A		



REFERENCE NO.		OTARI PART NO.	DISCRIPTION
IC	1, 31	1ALS244N	SN74LS244N
	2	1ALS260N	SN74LS260N
	3, 4, 8, 9, 15, 16	1MC14042	MC14042BC
	5, 17, 18, 32	1MC14584	MC14584B
	6	1ALS367N	SN74LS367N
	7, 14	1ALS258N	SN74LS258N
	10	I-0012	I-0012
	11, 24	1ALS32N	SN74LS32N
	12, 20, 25	1A07N	SN7407N
	13, 21, 26	1A259N	SN74259N
	19	1TD62301	TD62301
	22	1ALS132N	SN74LS132N
	23	1MC14538	MC14538B
	24	1MC14069	MC14069UB
	27, 33, 36	1ALS08N	SN74LS08N
	28, 30, 35	1ALS04N	SN74LS04N
	34	1ALS02N	SN74LS02N
	37	I-0028	I-0028
	38	1MC14050	MC14050B
Q	1	[illegible]	2SD799
	2, 3, 6, 7	[illegible]	2SC5711A
	4	[illegible]	2SC1815BL
	5	[illegible]	2SA1020Y
	5	[illegible]	2SA1015BL
D			
	1, 2, 3, 4, 5, 6, 7	[illegible]	SM-1A-02
	[illegible]	[illegible]	1S1588
	10, 11, 12, 13, 14, 15	[illegible]	TLR114

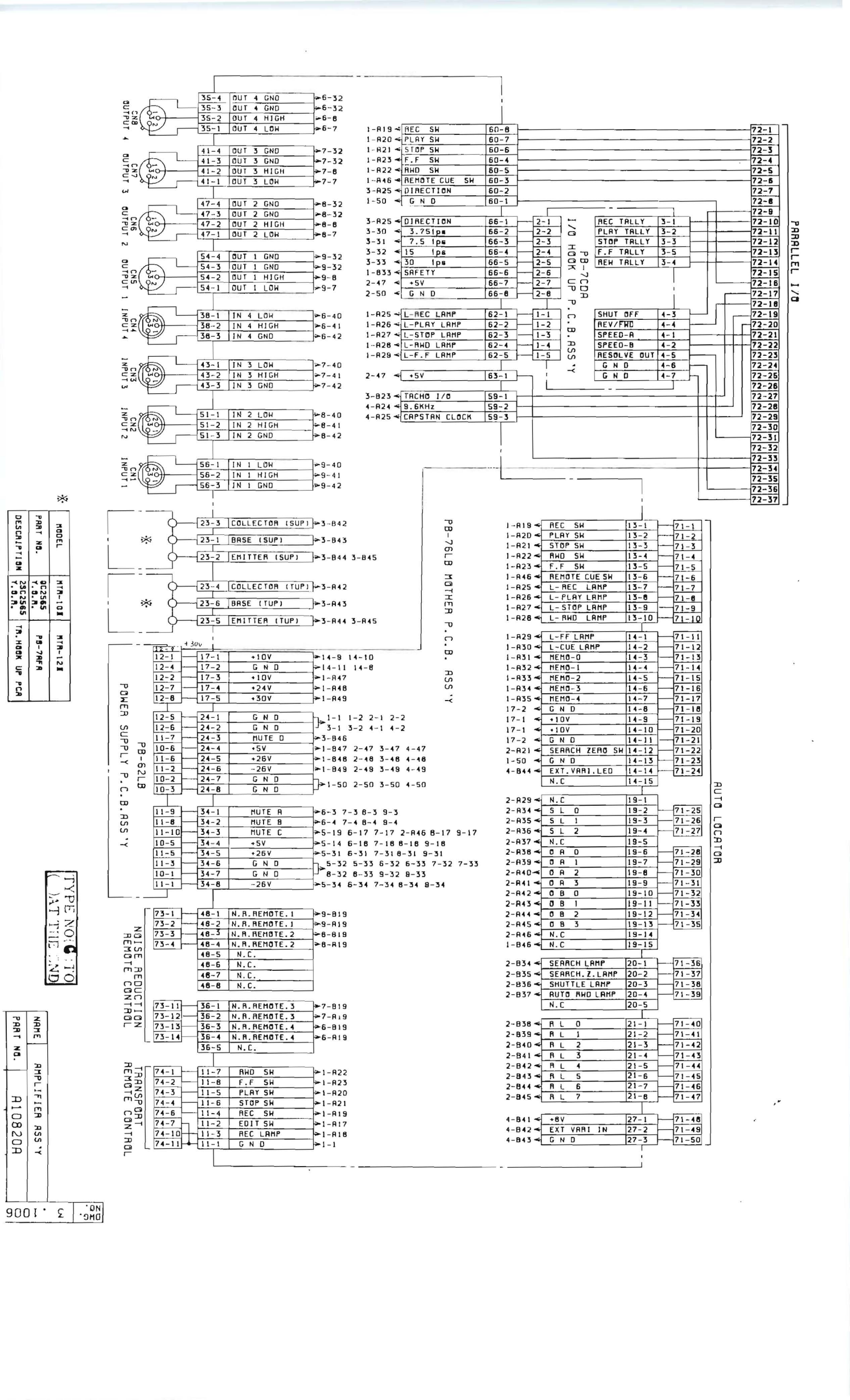

TYPE NO(A)TO
( )AT THE END
CAPSTAN CONTROL
PCB ASSY
PB-44WAB
PB-44WA (PB-46A)
PB-44WAA (PB-46G)
THIS SCHEMATIC DIAGRAM IS APPLIED TO (PB-44V)
OTARI Corporation
3.10154



TYPE NO(▲)TO
( )AT THE END

DWG NO. 3-6445

NAME	AUTO LOCATOR	SHEET 1 OF 1
PART NO.	CB1090B	
APPLIED		



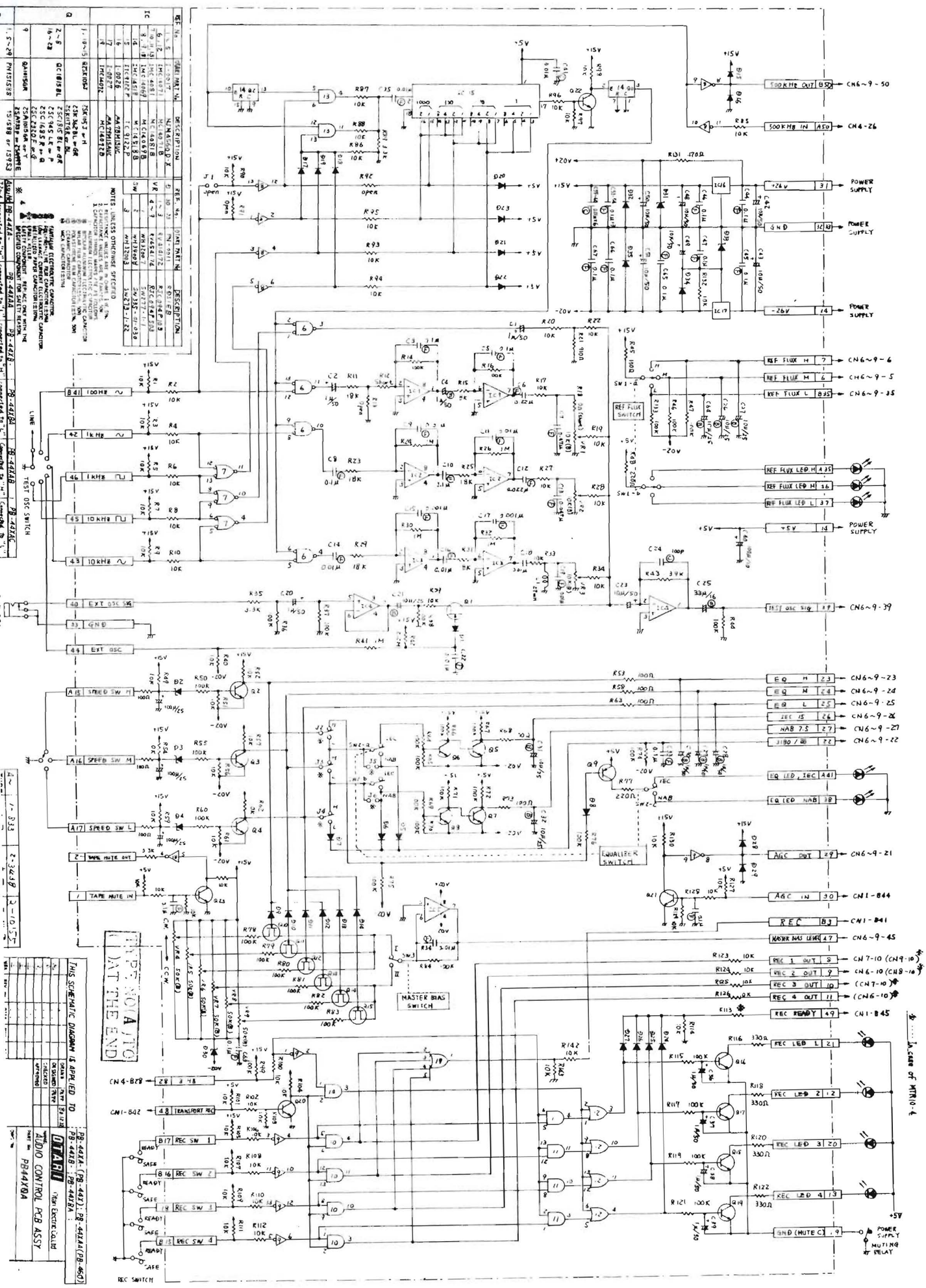
※

DESCRIPTION	PART NO.	MODEL
2SC2565 Y.G.R.	QC2565 Y.G.R.	MTR-10Ⅱ
TR. HOOK UP PCA	PB-7AFA	MTR-12Ⅱ

TYPE NO. IS TO BE PUT AT THE END

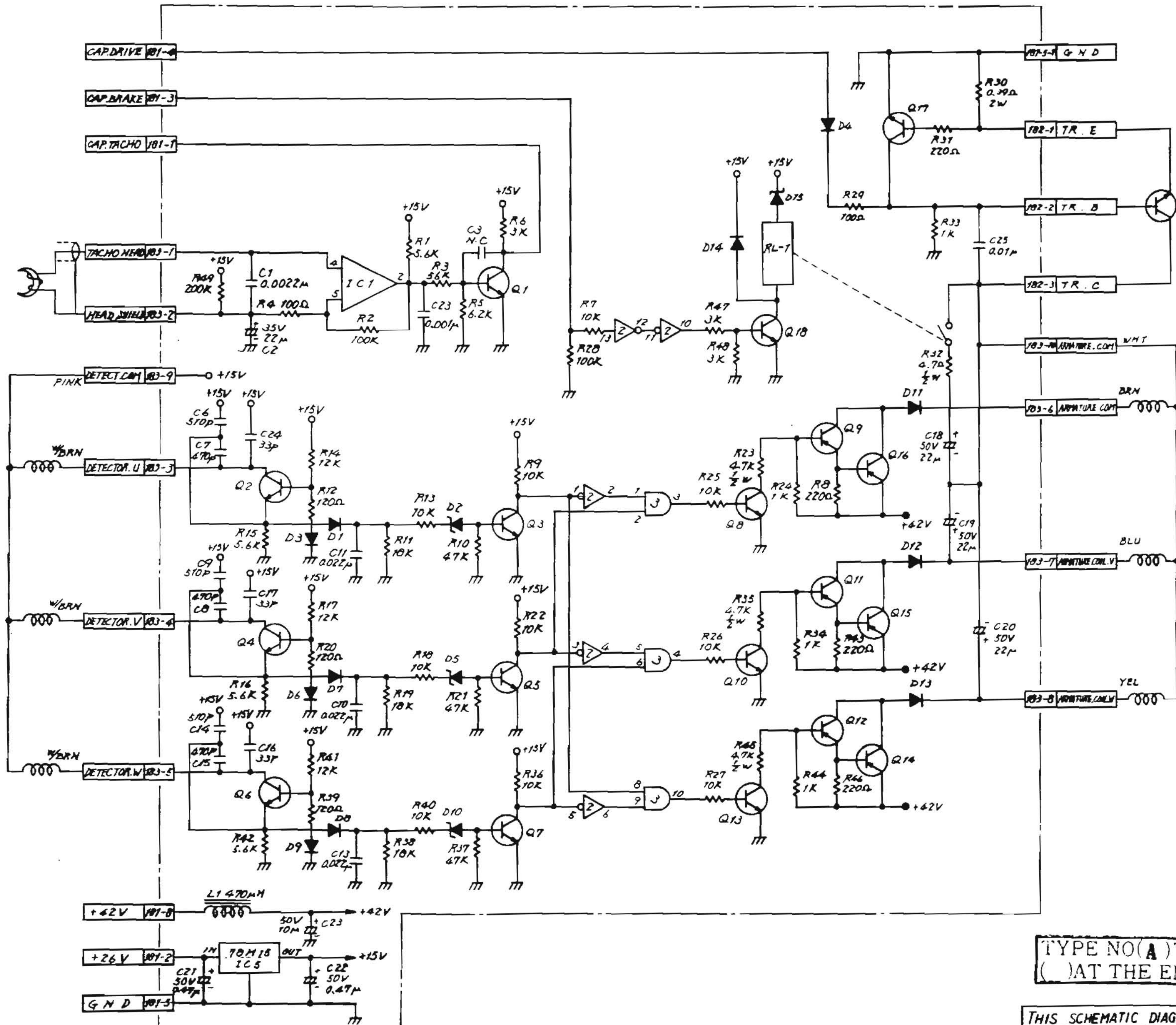
PART NO.	NAME
A10820A	AMPLIFIER ASS'Y

DWG. NO. 3.1006


AUDIO CONTROL PCB ASSY
PB-441XA
ATARI
MASTER BIAS SWITCH
EQUALIZER SWITCH
REF FLUX SWITCH
REC SWITCH
TEST OSC SWITCH
POWER SUPPLY
MUTING RELAY
THIS SCHEMATIC DIAGRAM IS APPLIED TO PB-441A (PB-441), PB-441AA (PB-460), PB-441B, PB-441BA.

10155

元 図	生産図	取説図	TYPE
2-3499	3-6498	3-10150	A~



REF. NUMBER		OTARI. PART NO.	DESCRIPTION
I.C	1.	ILM 2901	LM 2901
	2.	IMC 14584	MC 14584 BCP or HD 14584 BP TC 4584 BP
	3.	IMC 14081	MC 14081BCP or HD14081BP, TC 4081BP
	5.	IMC78M15	[illegible]
Q	1~8, 10, 13, 18	QC1685R	2SC1685R or Q 2SC1815BL or Y 2SC945LK or P 2SC2320F or G
	9, 11, 12	QA1184Y	2SA1184Y or O
	14, 15, 16	QB753Y	2SB753Y or O
	17	QC2655Y	2SC2655Y or O
D	1, 3, 4, 6, 7, 8, 9	PN1S1588	1S1588 or 1S953, 1N4148
	2, 5, 10	PNR3.6EB	RD3.6EB
	11 ~ 13, 14	PNSM1-02	SM1A-02 or V06E, V03G
	15	PNR2.7EB	RD2.7EB
RL	1	PYICAB3Q	G4W-1112P-DC12V

TYPE NO(A)TO
( )AT THE END

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, 1/4 W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
- ALUMINUM ELECTROLYTIC CAPACITOR.
- B : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
- M : MYLAR FILM CAPACITOR (±5%, 50V)
- S : POLYSTYRENE FILM CAPACITOR (±5%, 50V)
- CERAMIC CAPACITOR
- T : TANTALUM ELECTROLYTIC CAPACITOR.
- P : POLYPROPYLENE FILM CAPACITOR (±5%)
- L : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- MP : METALLIZED PAPER CAPACITOR (±10%)
- SPARK KILLER.

4. ⚠ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO : PB-45C PB-45CB

DRAWN	81.10.26
DESIGNED	
CHECKED	81.10.28
APPROVED	

OTARI Otari Electric Co.,Ltd.

NAME: CAPSTAN DRIVE PCB Ass'y

PART No. PB45C0A

DWG. No. 3.10150

NO	DWG. NO.	PART NO.	DESCRIPTION	REMARKS

REF. NUMBER		OTARI PART NUMBER	DESCRIPTION
IC	1.2.5.6	IHC 4558C	μPC 4558C
	3.7	IMC 14538	HD 145388P MC 145388CP TC 45388P
	4	I-NE555N	NE555N NE555V
	8	IHC 78M15	μPC 78M15H
Q	1	QA1020Y	2SA1020Y.O
	10.11 20.21 30.31 40.41	QC1685R	2SC1685R.Q 2SC1815BL.GR
D	1.3.5 7	PNTLR124	TLR124
	2.4.6 8	PN1S1588	1S1588 1N4148 1N4448 1S953

元 図	生産図	取説図	TYPE
Z-4132	Z-3993	[illegible]	A~

VR 1~4 . PHOTO.GAIN ADJ
(CCW MIN . CW MAX)

TYPE NO(A)TO
( )AT THE END

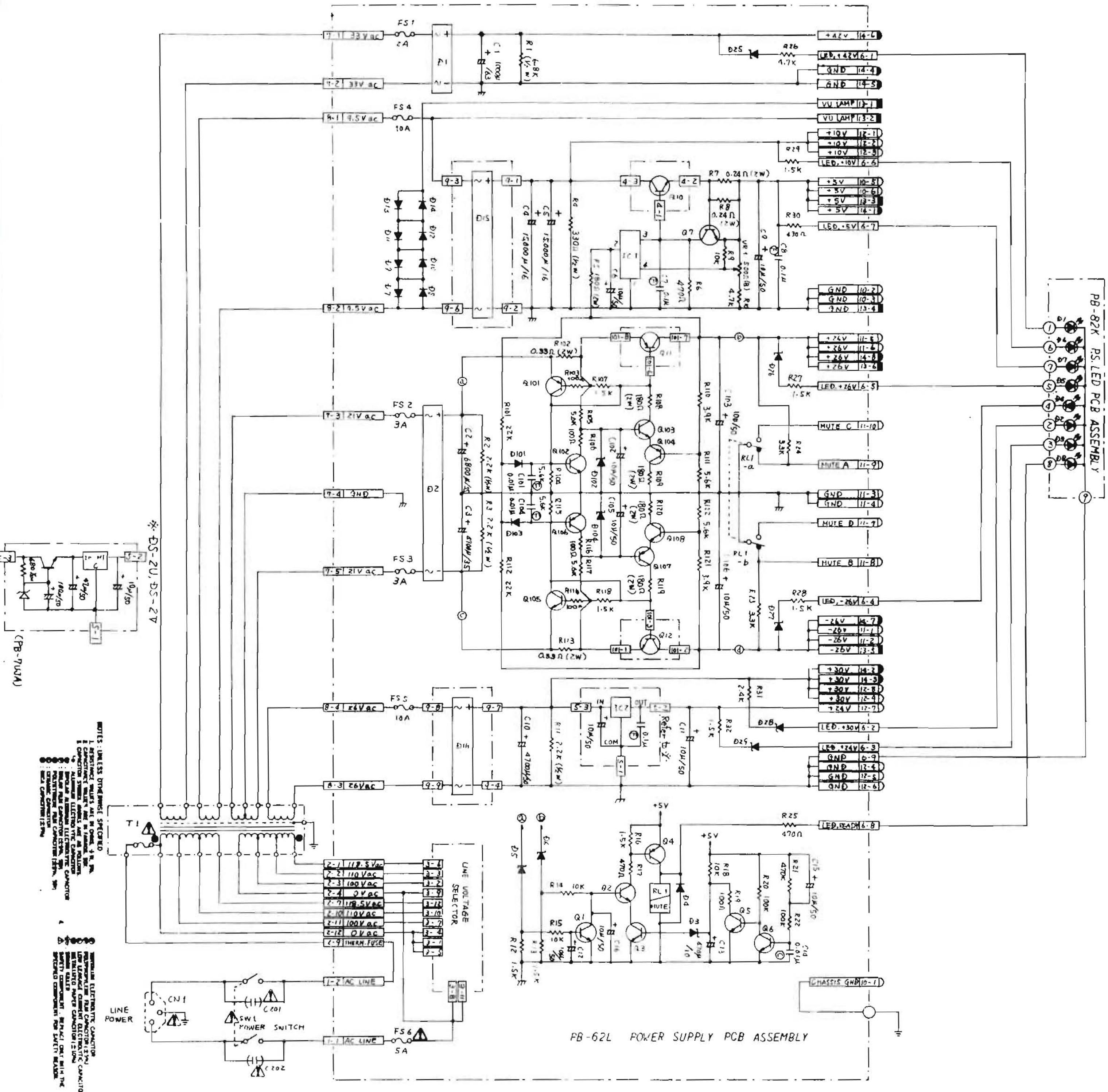
NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, ¼W, 5%
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
: ALUMINUM ELECTROLYTIC CAPACITOR.
: BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR
: MYLAR FILM CAPACITOR(±5%, 50V)
: POLYSTYRENE FILM CAPACITOR(±5%, 50V)
: CERAMIC CAPACITOR.
: TANTALUM ELECTROLYTIC CAPACITOR.
: POLYPROPYLENE FILM CAPACITOR(±5%)
: LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
: METALLIZED PAPER CAPACITOR(±10%)
: SPARK KILLER.
: SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON

DRAWN	82.7.2	OTARI Otari Electric Co., Ltd.
DESIGNED		NAME REEL SIZE DETECT PCB Ass'y
CHECKED	82.7.5	PART NO. PB460A
APPOVED	82.7.9	
MATERIAL		

PB9AS70

MODEL MTR-10

DWG NO 3-10160



LINE VOLT	CONNECTION
100	1-2 7-8 or 7-9
110	10-11 5-3
117	11-12 or 9-10 5-6
200	7-2
220	10-3
240	12-6

(NOTES ; CONNECTORS
To Mother P.C. Board
To Transport
To Audio Control Assy
To Power Supply Assy
CHASSIS

LOCATION	REF No		OTARI PART No	DESCRIPTION
PB-62L	IC	1	EEM9UIC	μA78MG
	Q	1~3, 5~7 102, 103 105, 108	QC1815 BL	2SC1815 BL or GR 2SC1318 Q, R, or S
		4, 101, 104 106, 107	QA1015 GR	2SA1015 GR or Y 2SA720 Q, R, or S
	D	1, 2	FN-4VB20	S4VB20
		3	FNR3.6EB	RD3.6EB
		5	FN-0074	RD36EB1
		6	FN-00[illegible]	RD20EB3
		4, 7~14	FNSM1-02	SM1A-02
		25~27 102, 104	FN-0044	RD15EB3
		101, 103	PN1S1588	1S1588
	FS	1	FH7F020	125V, 2A, φ5
		4~5	FH7E100	QGL10, 250V, 10A
		6 ⚠	FH9-007	T-QDL5, 250V, 5A
		2, 3	FH7F030	125V, 3A, φ5
	RL	1	RY2YC052	G2V-2, DC5V
	VR	1	RV451Z22	[illegible]

LOCATION	REF. No		OTARI PART No	DESCRIPTION
PB-82K	D	1~8	PN9LYPR4	GL-9PR4 (red)
CHASSIS	SW	1 ⚠	WH92018	EL215K1Z
	IC	2	IMC14324	μPC14324H or μA7824UC
	Q	10	QC2565 O	2SC2565 O or 2SC2773
		11	QB8630	2SB8630
		12	QD1148O	2SD1148O
	C	201, 202 ⚠	CR2002[illegible]	[illegible]
	CN	1 ⚠	CN603012	CM-3
	T	1 ⚠	TF11058A	MTR 10
			TF11075	MTR 12
	D	15, 16	FN-0143	S1SVB20

TYPE NO(J)TO ( )AT THE END

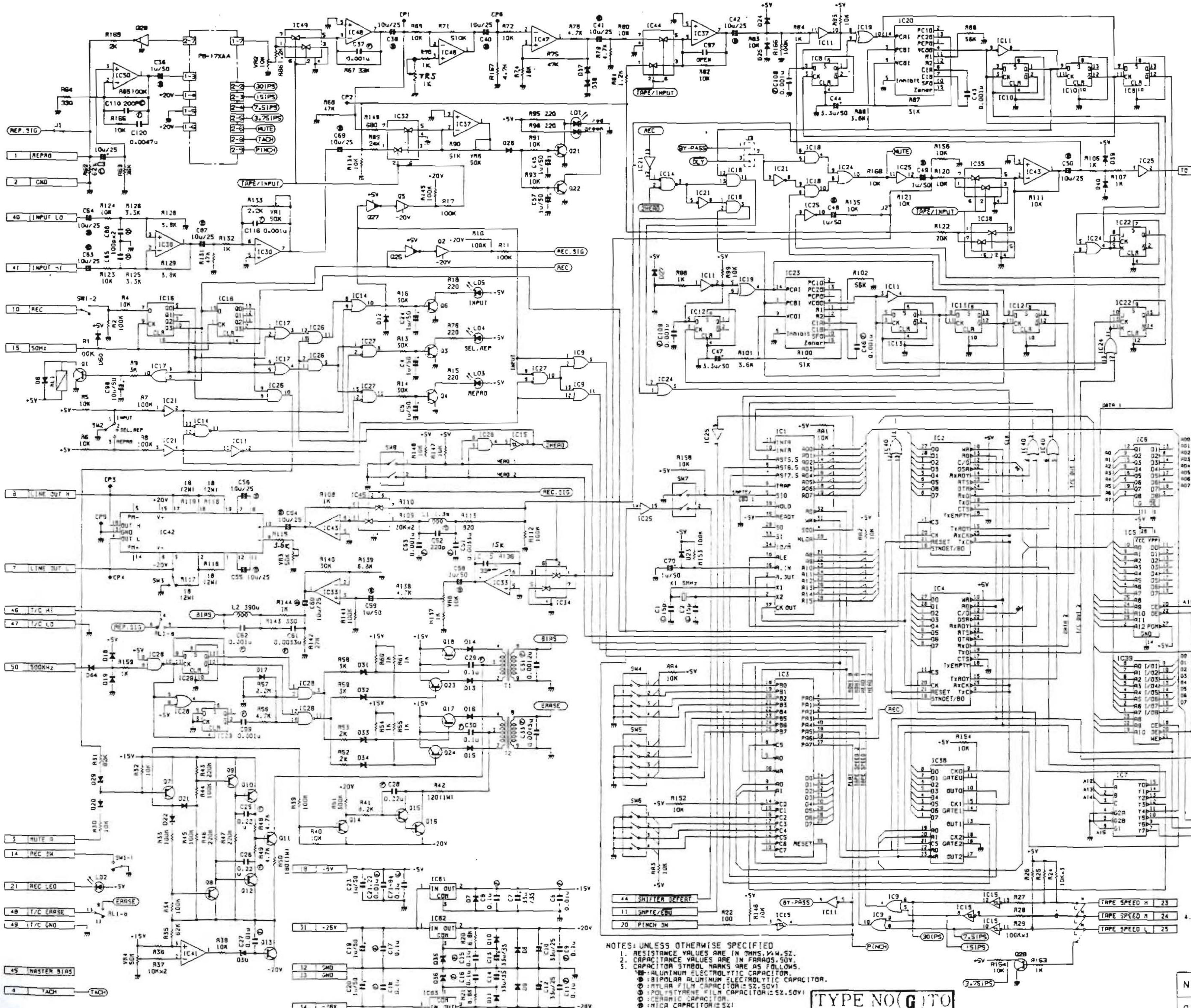
THIS SCHEMATIC DIAGRAM IS APPLIED TO : DS-1Y : DS-2F

OTARI Otari Electric Co.,Ltd.

POWER SUPPLY ASSEMBLY

DS1Y00B

3 .10158



REFERENCE NO.		OTARI PART NO.	DESCRIPTION
IC	1	IMSL8085	MSL8085AP
	2.4	IMSL8251	MSL8251AP
	3	IMSL8255	MSL8255AP-5
	5	I-0065	D27128A
	6	IALS373N	SN74LS373N
	7	IALS138N	SN74LS138N
	8.10.12.13.29 64	IMC14013	MC14013BCP
	9.14.17.24.40	IMC14071	MC14071BCP
	11.21	IMC14069	MC14069BCP
	15	IMC14584	MC14584BCP
	16	IMC14015	MC14015BCP
	18.26	IMC14081	MC14081BCP
	19	IMC14070	MC14070BCP
	20.23	IMC14046	MC14046BCP
	22	IMC14027	MC14027BCP
	25	IMC14050	MC14050BCP
	27	IMC14001	MC14001BCP
	28	IMC14011	MC14011BCP
	30.33.43.47.48	I-0019	NE5532N
	32.34.35.36 44.45. 49	I-0053	
	37.41	I-0017	NJM4560D-X
	38	IMSL8253	MSL8253P-5
	39	I-0021	HM6116P-4
	42	I-G178-B	
	50	I-0081	NJM2043
	61.62	IMC78M15	UPC78M15H
	63	IMC79M15	UPC79M15H
LD	1	PN-0161	LN16WPF
	2	PNTLR124	TLR124
	3	PNTLO124	TLO124
	4	PNTLG124	TLG124
	5	PNTLY124	TLY124
D	6.7.8.9.10.11	PMSM1-02	SM-1A-02
	12-28.39-43.50	PN-0199	1DH9815
	29	PN-0026	RD5.2EB3
	30.35.36	PN-0011	RD5.1EB3
	31-34	PN-0032	RD10EB3
	37.38	PN-0008	RD4.7EB3
	44	PN-0044	RD15EB3
Q	1	QC1318A	2SC1318A
	3.4.6.8.12-15 21.22	QC1815BL	2SC1815BL
	2.5.25.28	Q-0010	UN1215.UN4215
	7.9-11	QA1015GR	2SA1015GR
	16	QC2655Y	2SC2655Y
	17.18.23.24	QA720R	2SA720R
	26.27	Q-0006	UN1113
	29	Q-0008	RT N1415

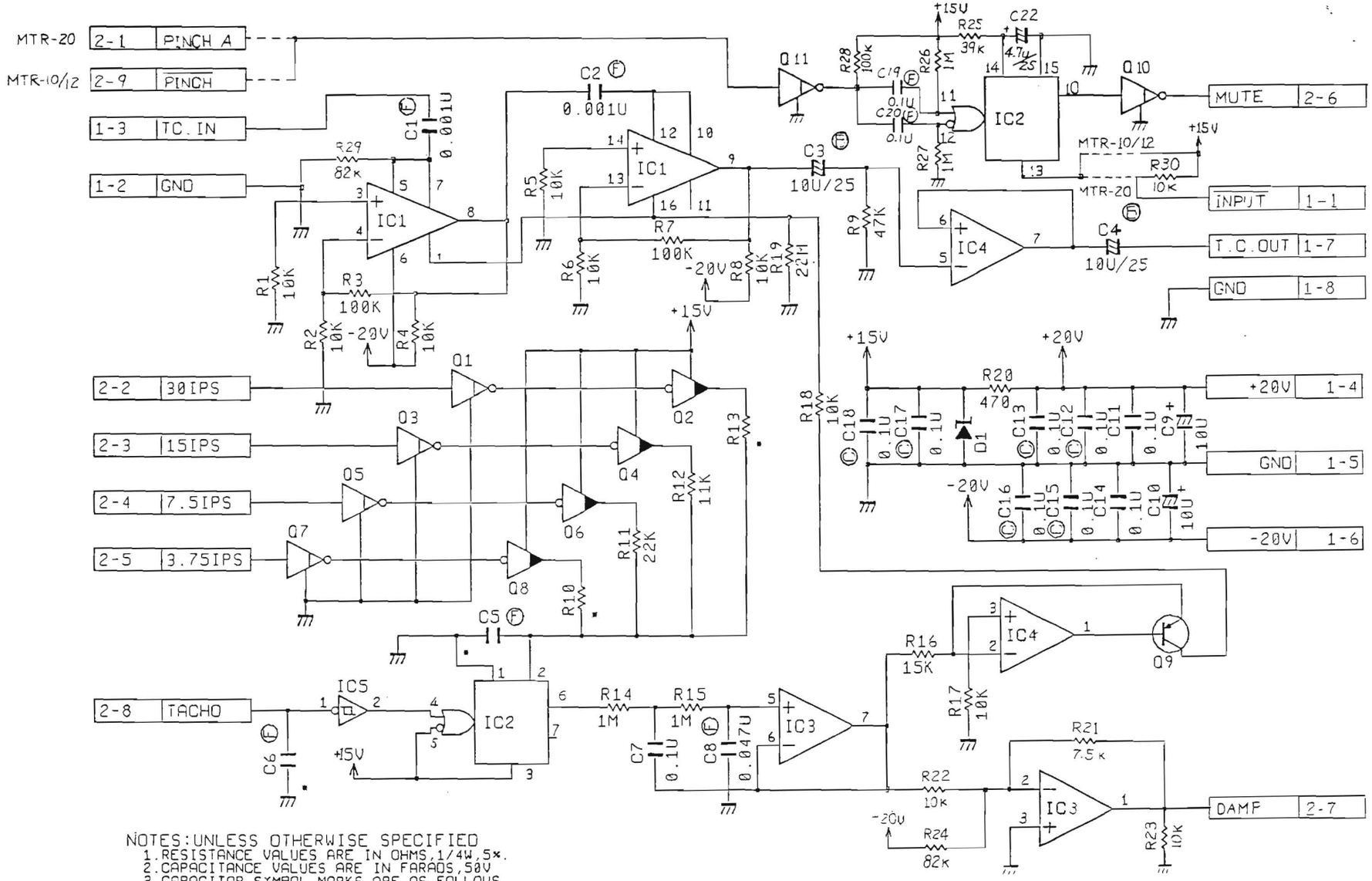
REF.NO.		OTARI PART NO.	DESCRIPTION	
VR	1	RV454174	EVMCOTA01B54	INPUT LEVEL
	2	RV414172	EVMCOTA01B14	REPRO LEVEL
	3	RV454174	EVMCOTA01B54	OUTPUT LEVEL
	4	RV454174	EVMCOTA01B54	RECORD BIAS
	5	RV413203	GF06P-1K	PHASE COMP
	6	RV454210	GF06P-50K	MONITOR LED
	7	RV424208	GF06P-20K	TEST OSC LEVEL
	8	RV414207	GF06P-10K	REC LEVEL
RL	1	RY2Y052	G2V-2-DC5V	REC RELAY
SW	1	WM52003	SW273-1-22	REC READY/SAFE
	2	WM52007	SW277-1-2	MONITOR MODE
	3	WM51008	SS5012	LINE OUTPUT MODE
	4	WM94008	A6MS-4	DELAY FINE ADJ.P
	5	WM94008	A6MS-4	DELAY FINE ADJ.R
	6	WM94008	A6MS-4	DELAY FINE ADJ.E
	7	WM92021	SS5202	SMPTE/EBU
	8	WM92021	SS5202	HEAD VARIATION

NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS.1/4W.5%.
2. CAPACITANCE VALUES ARE IN FARADS.50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   :ALUMINUM ELECTROLYTIC CAPACITOR.
   :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   :MYLAR FILM CAPACITOR(±5%.50V)
   :POLYSTYRENE FILM CAPACITOR(±5%.50V)
   :CERAMIC CAPACITOR.
   :MICA CAPACITOR(±5%)
   :TANTALUM ELECTROLYTIC CAPACITOR.
   :POLYPROPYLENE FILM CAPACITOR(±5%)
   :LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
   :METALLIZED PAPER CAPACITOR(±10%)
   :SPARK KILLER.
4. ⚠ :SAFETY COMPONENT :REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

TYPE NO(G)TO
( )AT THE END

NAME	T.C P.C.B. ASS'Y
PART NO.	PB47R0B

13.1



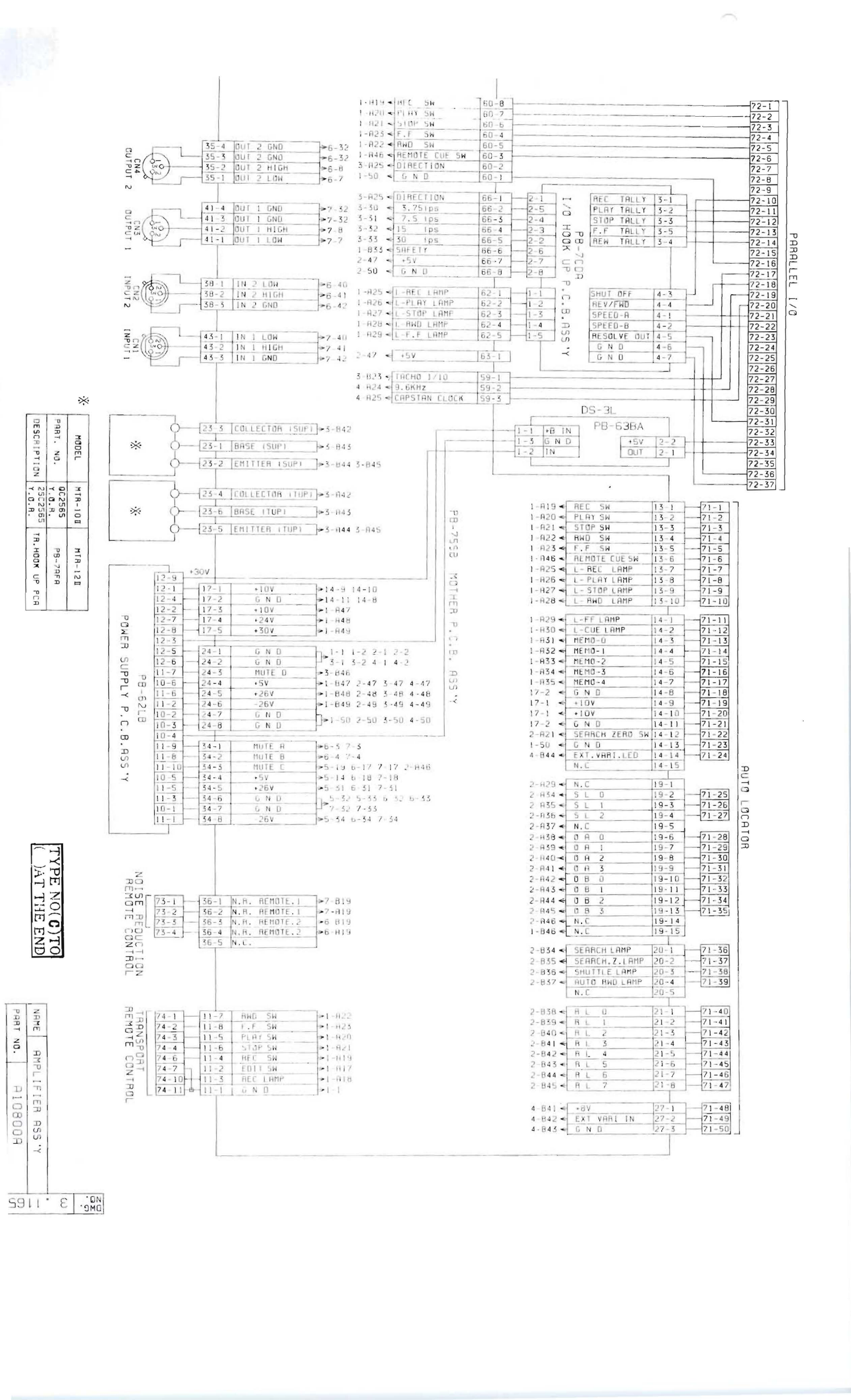
NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⏚ : ALUMINUM ELECTROLYTIC CAPACTOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓜ : MYLAR FILM CAPACITOR(±5%, 50V)
   - Ⓟ : POLYSTYRENE FILM CAPACITOR(±5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR(±5%)
   - ⊖ : TANTALUM ELECTROLYTIC CAPACITOR.
   - Ⓟ : POLYPROPYLENE FILM CAPACITOR(±5%)
   - Ⓒ : LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
   - Ⓔ : METALLIZED PAPER CAPACITOR(±10%)
   - ⏚ : SPARK KILLER.
   - △ : SEFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

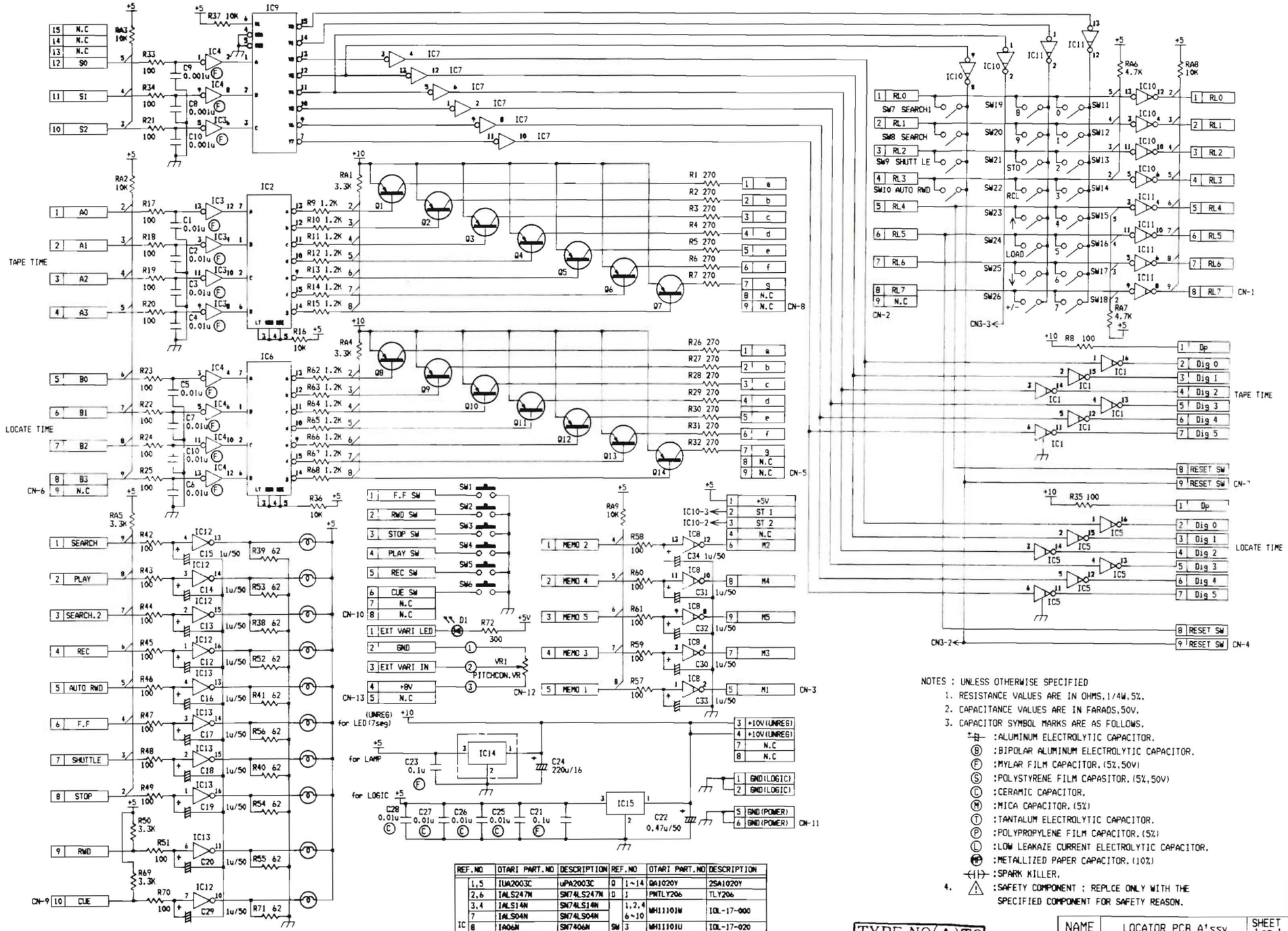
TYPE NO. (G) TO
AT THE END

REF. NO / ASS. NO	R10	R13	C5	C6
PB-17XMA	43K	5.1K	0.0047U	0.0039U
PB-18GA	47K	5.6K	0.015U	0.001U

REF. NO.		OTARI PART NO.	DESCRIPTION
IC	1	I-0023	NJM13600D
	2	IMC14538	MC145388
	3	ITL082CP	TL082CP
	4	I-0017	NJM4560D-X
	5	IMC14584	MC145848
D	1,3,5,7,10,11	0-0010	RT1N441S
	2,4,6,8	0-0006	RT1P441S
	9	0A1015	2SA1015GR

NAME	FILTER PCA
PART NO.	PB17X0A
DWG.	3 .11639


CN4 OUTPUT 2
35-4 OUT 2 GND
35-3 OUT 2 GND
35-2 OUT 2 HIGH
35-1 OUT 2 LOW
CN3 OUTPUT 1
41-4 OUT 1 GND
41-3 OUT 1 GND
41-2 OUT 1 HIGH
41-1 OUT 1 LOW
CN2 INPUT 2
38-1 IN 2 LOW
38-2 IN 2 HIGH
38-5 IN 2 GND
CN1 INPUT 1
43-1 IN 1 LOW
43-2 IN 1 HIGH
43-3 IN 1 GND
PB-70CB I/O HOOK UP P.C.B.ASS'Y
REC TALLY 3-1
PLAY TALLY 3-2
STOP TALLY 3-3
F.F TALLY 3-5
REW TALLY 3-4
SHUT OFF 4-3
REV/FWD 4-4
SPEED-A 4-1
SPEED-B 4-2
RESOLVE OUT 4-5
G N D 4-6
G N D 4-7
PARALLEL I/O
72-1 72-2 72-3 72-4 72-5 72-6 72-7 72-8 72-9 72-10 72-11 72-12 72-13 72-14 72-15 72-16 72-17 72-18 72-19 72-20 72-21 72-22 72-23 72-24 72-25 72-26 72-27 72-28 72-29 72-30 72-31 72-32 72-33 72-34 72-35 72-36 72-37
DS-3L
PB-63BA
+B IN 1-1
G N D 1-3
IN 1-2
+5V OUT 2-2 2-1
※
MODEL MTR-10Ⅱ MTR-12Ⅱ
PART. NO. QC2565 Y.0.R. 252565 Y.0.R. PB-78FA
DESCRIPTION TR.HOOK UP PCA
23-3 COLLECTOR (SUP)
23-1 BASE (SUP)
23-2 EMITTER (SUP)
23-4 COLLECTOR (TUP)
23-6 BASE (TUP)
23-5 EMITTER (TUP)
POWER SUPPLY P.C.B.ASS'Y PB-62LB
+30V
+10V
G N D
+10V
+24V
+30V
MUTE D
+5V
+26V
-26V
MUTE A
MUTE B
MUTE C
PB-75CB MOTHER P.C.B. ASS'Y
REC SW 13-1
PLAY SW 13-2
STOP SW 13-3
RWD SW 13-4
F.F SW 13-5
REMOTE CUE SW 13-6
L-REC LAMP 13-7
L-PLAY LAMP 13-8
L-STOP LAMP 13-9
L-RWD LAMP 13-10
L-FF LAMP 14-1
L-CUE LAMP 14-2
MEMO-0 14-3
MEMO-1 14-4
MEMO-2 14-5
MEMO-3 14-6
MEMO-4 14-7
G N D 14-8
+10V 14-9
+10V 14-10
G N D 14-11
SEARCH ZERO SW 14-12
G N D 14-13
EXT.VARI.LED 14-14
N.C 14-15
N.C 19-1
S L 0 19-2
S L 1 19-3
S L 2 19-4
N.C 19-5
D A 0 19-6
D A 1 19-7
D A 2 19-8
D A 3 19-9
D B 0 19-10
D B 1 19-11
D B 2 19-12
D B 3 19-13
N.C 19-14
N.C 19-15
SEARCH LAMP 20-1
SEARCH.Z.LAMP 20-2
SHUTTLE LAMP 20-3
AUTO RWD LAMP 20-4
N.C 20-5
R L 0 21-1
R L 1 21-2
R L 2 21-3
R L 3 21-4
R L 4 21-5
R L 5 21-6
R L 6 21-7
R L 7 21-8
+8V 27-1
EXT VARI IN 27-2
G N D 27-3
AUTO LOCATOR
NOISE REDUCTION REMOTE CONTROL
N.R. REMOTE.1
N.R. REMOTE.1
N.R. REMOTE.2
N.R. REMOTE.2
N.C.
TRANSPORT REMOTE CONTROL
RWD SW
F.F SW
PLAY SW
STOP SW
REC SW
EDIT SW
REC LAMP
G N D
TYPE NO(C)TO ( )AT THE END
PART NO. A10800A
NAME AMPLIFIER ASS'Y
DWG NO. 3-1165



NOTES : UNLESS OTHERWISE SPECIFIED

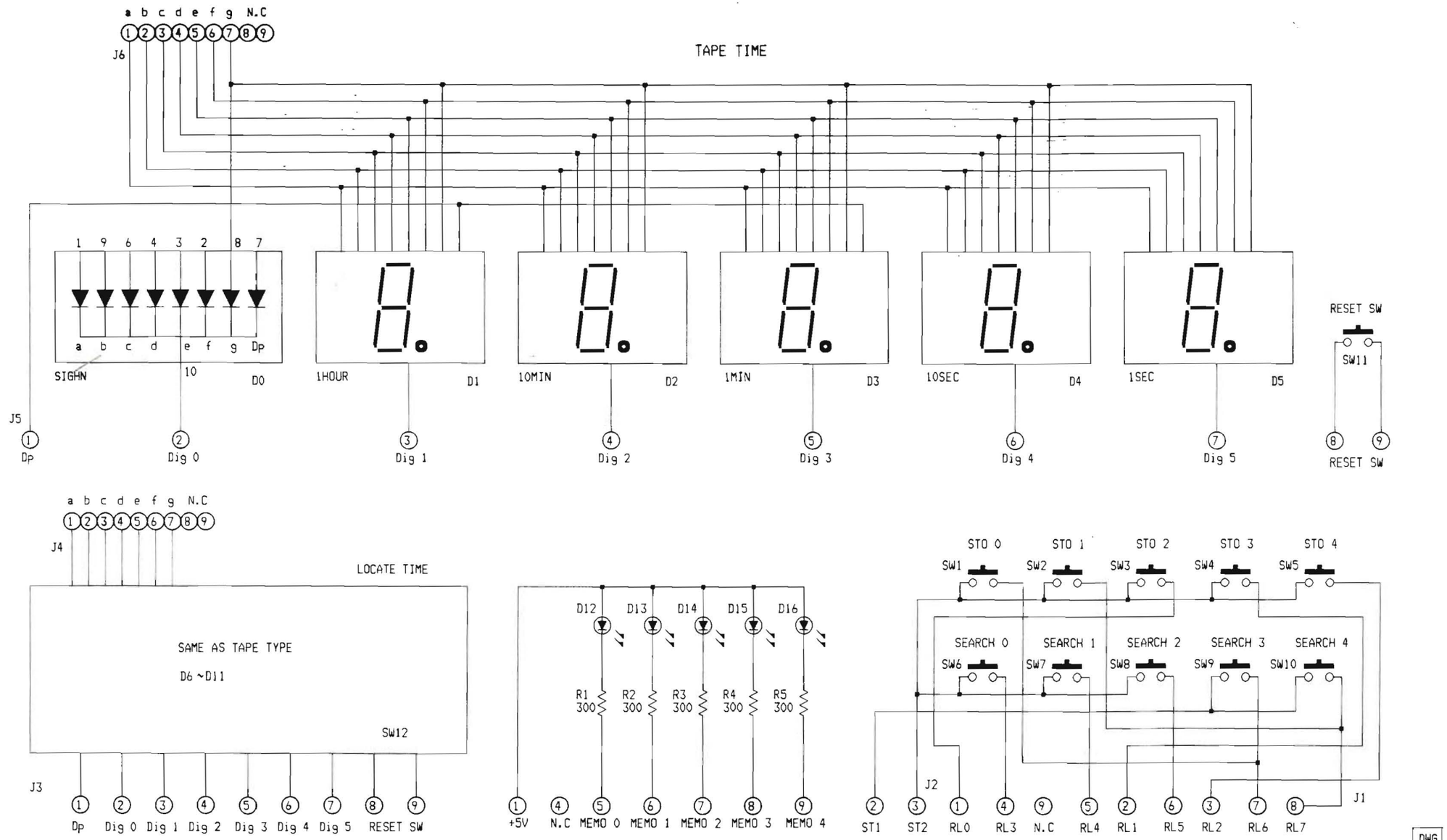
1. RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⊣(+)⊢ :ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ :BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓕ :MYLAR FILM CAPACITOR. (5%, 50V)
   - Ⓢ :POLYSTYRENE FILM CAPASITOR. (5%, 50V)
   - Ⓒ :CERAMIC CAPACITOR.
   - Ⓜ :MICA CAPACITOR. (5%)
   - Ⓣ :TANTALUM ELECTROLYTIC CAPACITOR.
   - Ⓟ :POLYPROPYLENE FILM CAPACITOR. (5%)
   - Ⓛ :LOW LEAKAZE CURRENT ELECTROLYTIC CAPACITOR.
   - Ⓜ :METALLIZED PAPER CAPACITOR. (10%)
   - ⊣|⊢ :SPARK KILLER.
4. ⚠ :SAFETY COMPONENT ; REPLCE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

REF.NO		OTARI PART.NO	DESCRIPTION	REF.NO		OTARI PART.NO	DESCRIPTION
IC	1,5	IUA2003C	uPA2003C	Q	1~14	QA1020Y	2SA1020Y
	2,6	IALS247N	SN74LS247N	D	1	PWTLY206	TLY206
	3,4	IALS14N	SN74LS14N	SW	1,2,4 6~10	WH11101W	IQL-17-000
	7	IALS04N	SN74LS04N		3	WH11101U	IQL-17-020
	8	IA06N	SN7406N		5	WH11101R	IQL-17-010
	9	IALS138N	SN74LS138N		11~26	WH11085	KBD801N
	10,11	IA07N	SN7407N	VR	1	RV014026	EWS-MCAS20B14
	12,13	ITD6Z301	TD6Z301P				
	14,15	IHC14305	uPC14305H				

TYPE NO(A)TO ( )AT THE END

NAME	LOCATOR PCB A'ssy	SHEET 1 OF 1
PART NO.	PB45F0A	
APPLIED	PB-45F0	

DWG NO. 3-6444



NOTES : UNLESS OTHERWISE SPECIFIED

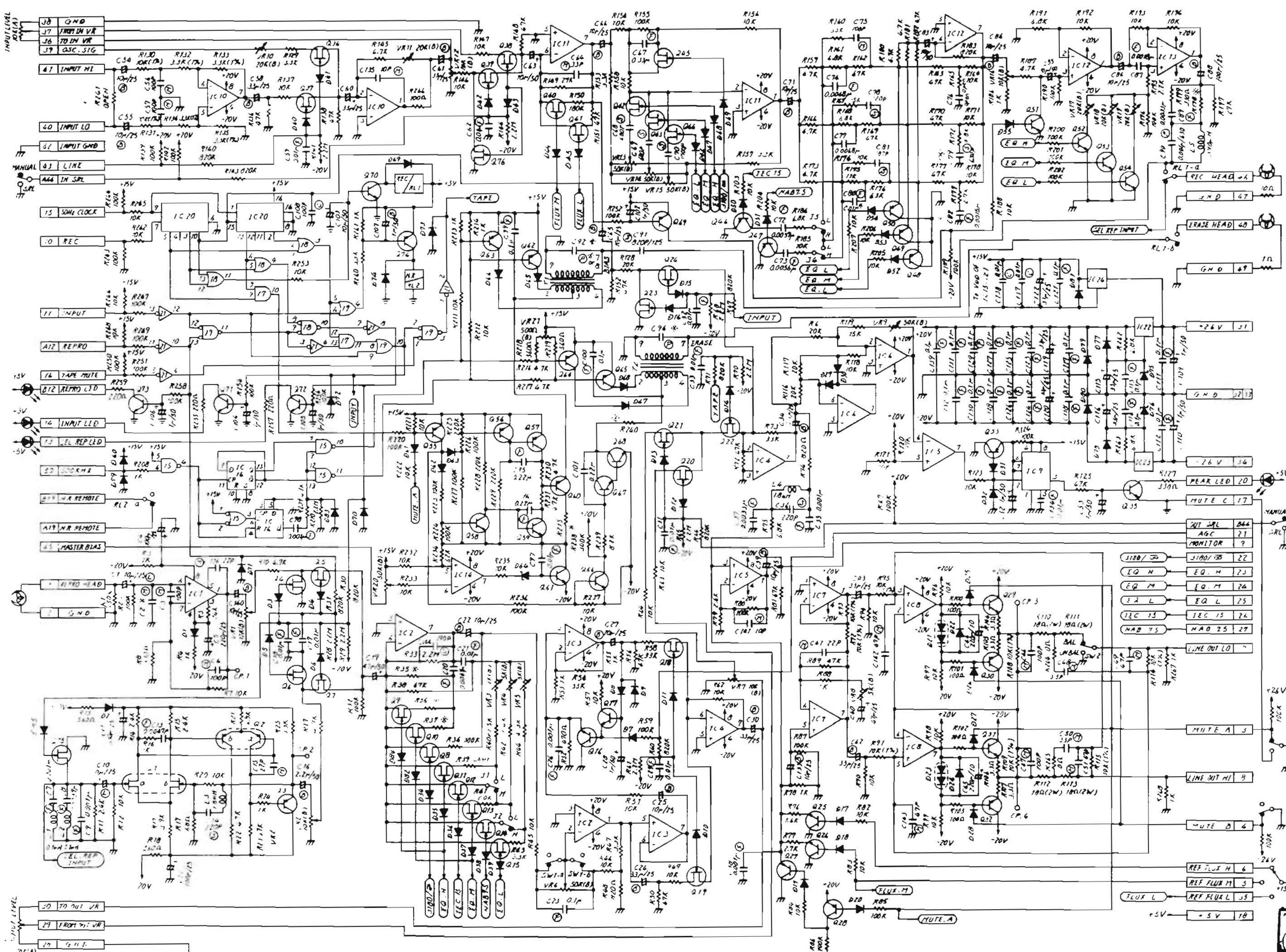
1. RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
   - ⁺# : ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓑ : BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
   - Ⓕ : MYLAR FILM CAPACITOR. (5%, 50V)
   - Ⓢ : POLYSTYRENE FILM CAPASITOR. (5%, 50V)
   - Ⓒ : CERAMIC CAPACITOR.
   - Ⓜ : MICA CAPACITOR. (5%)
   - Ⓣ : TANTALUM ELECTROLYTIC CAPACITOR.
   - Ⓟ : POLYPROPYLENE FILM CAPACITOR. (5%)
   - Ⓛ : LOW LEAKAZE CURRENT ELECTROLYTIC CAPACITOR.
   - Ⓜ : METALLIZED PAPER CAPACITOR. (10%)
   - ⊣|⊢ : SPARK KILLER.
4. ⚠ : SAFETY COMPONENT ; REPLCE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

REF.NO		OTARI PART.NO	DESCRIPTION
LD	D0 ~ D11	PN-0153	TLR312D
	D12~ D16	PNTLY206	TLY206
SW	1 ~ 5	WH11084I	532,000,011
	6 ~ 10	WH11084C	532,000,009
	11,12	WH11084Y	532,000,002

TYPE NO(▲)TO
( )AT THE END

NAME	LED PCB Ass'y	SHEET 1 OF1
PART NO.	PB82U0A	

DWG NO. 3-6441



REF NO.		OTARI PART NO.	DESCRIPTION
IC	1	INA12017	HA12017
	2~8,11,12,16	I-0017	NJM4560D-X
	10, 13	I-0019	NE5532N
	15	IMC14011	MC14011B
	16	IMC14013	MC14013B
	17	IMC14081	MC14081B
	18, 19	IMC14071	MC14071B
	20	IMC14015	MC14015B
	21	IMC14069	MC14069B
	22, 24	IMC78M15	μPC78M15H or μA78M15UC
	23	IIM15AUC	μA79M15AUC
	9	I-NE555V	NE555N
Q	29, 31	QD381L	2SD381L or 2SC2238Y
	30, 32	QB536L	2SB536L or 2SA968Y
	1	QA131L	2SK131L or 2SK146BL
	2	QA798G	2SA798G
	3, 28, 33, 60, 46~50, 55~57, 69	QA1015GR	2SA1015GR or Y, 2SA733P or 2SA999E
	6~15, 19, 20, 22~26, 36, 38, 40~44, 76	Q2SK105J	2SK105J or H, 2SK117GR or BL, 2SK[illegible]GR [illegible]
	16, 17, 25~27, 35, 51, 58, 59, 66~67, 71~73	QC1815BL	2SC1815BL or GR, 2SC945LK or P, 2SC1685R or Q, 2SC2320F or G
	[illegible] 75	Q2SJ74BL	2SJ74BL or GR [illegible]
	61 [illegible]	[illegible]	[illegible] 2SD[illegible]
	52~54	QC2878	2SC2878
	62~65, 76	QA720R	2SA720R or S
	70	QC1318R	2SC1318R or S, 2SC1959Y
D	1, 2, 69, 74, 77~81	PNSM1-02	SM1A-02
	3~20, 22, 26, 29~61, 70~73, 82~85	PN1S1588	1S1588 or 1S953 or 1SM1615
	21, 23	PMKB-[illegible]	-
	25~28, 65~68	PN1N4448	1N4448, FH0TS[illegible] or 1N6[illegible]
	64, 75, 76	PH-0011	RBS [illegible]CB3

REF NO.		OTARI PART NO.		DESCRIPTION
VR	1	RV616172	RJC096P103	REPRO. LEVEL
	2	RV616172	RJC096P103	SEL. REP. LEVEL
	3	RV623276	PH822H202V	REP. EQ. HIGH
	4	RV653218	PH822H502V	REP. EQ. MID
	5	RV653218	PH822H502V	REP. EQ. LOW
	6	RV656176	RJC096P503	LOW FREQ. COMP.
	7	RV616172	RJC096P103	OUTPUT SEL
	8	RV658206	PH822H502H	OUTPUT LEVEL
	9	RV654270	PH822H503H	MAR TRIGGER LEVEL
	10	RV626208	PH822H203H	TEST OSC LEVEL
	11	RV626173	RJC096P203	INPUT SENSITIVITY
	12	RV616192	RJC096P103	INPUT SEL
	13	RV654272	PH822H503V	REC. EQ. HIGH
	14	RV654272	PH822H503V	REC. EQ. MID
	15	RV654272	PH822H503V	REC. EQ. LOW
	16	RV616172	RJC196P103	REC LEVEL
	17	RV626270	PH822H203V	PHASE COMP HIGH
	18	RV626270	PH822H203V	PHASE COMP MID
	19	RV626270	PH822H203V	PHASE COMP LOW
	20	RV656176	RJC096P503	RECORD BIAS
	21	RV652702	PH822H501H	ERASE SYMMETRY
RL	1	RY27C052	G2V-2-DC5V	REC. RELAY
	2	RY1YC023	DR211AD005	N.R. REMOTE RELAY
SW	1	WM32003	SWC93-1-22	LOW FREQ. COMP.
	2	WM31016	SS5012	LINE OUTPUT MODE
T	1, 2	TF31019		

※	PB-14XA-		PB-14XAA	PB-14XAB		PB-14XA-		PB-14XAA	PB-14XAB
	MTR 10 2.[illegible]		MTR 10-4&B	MTR 10-G&M	C76	0.0012μ /630V		0.0018μ /630V	0.0022μ /630V
R213	220(1W)		100(2W)	220(1W)	81	15[illegible]		150K	open
R180	180(1W)		100(2W)	100(2W)	R35	2.2M		open	open
[illegible]	67P		open	67P	R36	390k		392k	470k
C72	0.0012μ /630V		[illegible]00P /630V	0.0012μ /630V	R37	[illegible]M		2.2M	1M
					R148	[illegible]		1k	open

NOTES UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, 1/4W 5%
2. CAPACITANCE VALUES ARE IN FARADS, 50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS
- ALUMINUM ELECTROLYTIC CAPACITOR
- BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR
- MYLAR FILM CAPACITOR ±5% 50V
- POLYSTYRENE FILM CAPACITOR ±5% 50V
- CERAMIC CAPACITOR
- MICA CAPACITOR ±5%
- TANTALUM ELECTROLYTIC CAPACITOR
- POLYPROPYLENE FILM CAPACITOR ±5%
- LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR
- METALLIZED PAPER CAPACITOR ±10%
- SPARK KILLER
- SAFETY COMPONENT. REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

TYPE NO(G)TO ( )AT THE END

THIS SCHEMATIC DIAGRAM IS APPLIED TO PB-14XA-(PB-14X, PB-15S) PB-14XAF(PB-15U) PB-14XA[illegible](PB-15X)

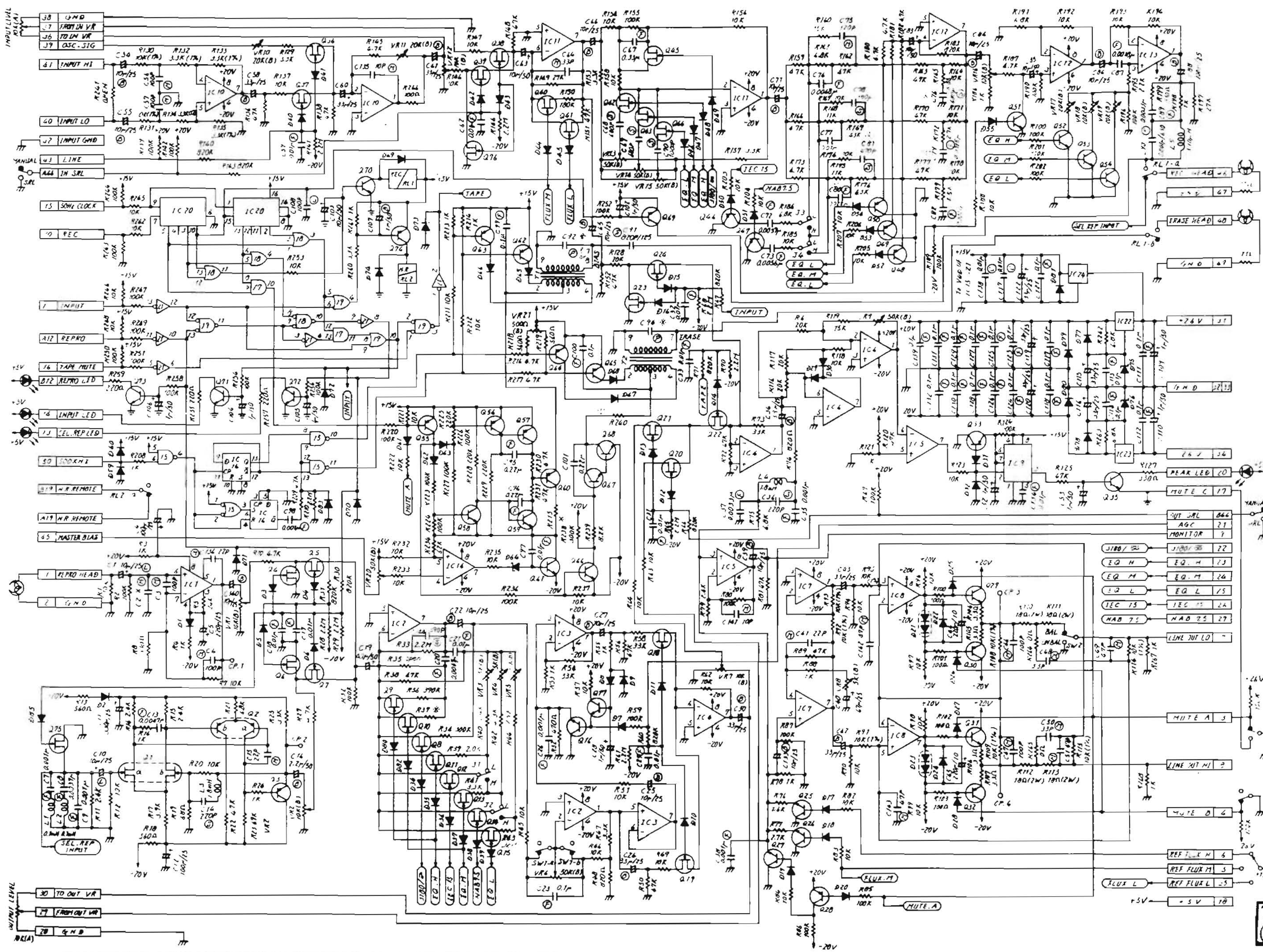
OTARI Otari Electric Co., Ltd.

NAME AUDIO AMPLIFIER PCB Assy

PART NO. PB14XOA

THIRD ANGLE PROJECTION

10156



REF NO	OTARI PART NO	DESCRIPTION
1	1HA12017	HA12017
2–8, 11, 12, 14	1-0017	NJM4560D
10, 13	1-0017	NE5532N
15	1MC14011	MC14011B
16	1MC14013	MC14013B
17	1MC14081	MC14081B
18, 19	1MC14071	MC14071B
20	1MC14015	MC14015B
21	1MC14069	MC14069B
22, 24	1MC78M15	μPC78M15H or μA78M15
23	1IM15AUC	μA79M15AUC
9	1-NE555V	NE555V
29, 31	QD381L	2SD381L or 2SC2238Y
30, 32	QB536L	2SB536L or 2SA968Y
1	QA131L	2SK131L or 2SK146BL
2	QA798G	2SA798G
3, 28, 33, 60, 46–50, 55–57, 69	QA1015GR	2SA1015GR or Y
4, 15, 19, 20, 22–26, 36, 38, 40, 44, 76	Q2SK105	2SK105 or H; 2SK117GR or BL; 2SK362 BL or GR
16, 17, 25–27, 35, 51, 58, 59, 66–67, 71–73	QC1815BL	2SC1815BL or GR; 2SC945 K or F; 2SC1685 P or Q; 2SC2320F
10, 31, 42, 75	Q2SJ74BL	2SJ74BL or GR
61, 68		
52–54	QC2878	2SC2878
62–63, 76	QA720R	2SA720R or S
70	QC1318R	2SC1318R or S, 2SC1959Y
1, 2, 29, 74, 77–81		
3–20, 22, 24, 29–63, 70–73, 82–85	PH1S	1S1588 or 1S953
21, 23		
25–28, 65–68	PH1N4448	1N4448, 1N4148
64, 75, 76	PH-0011	RD5.1EB3

REF NO		OTARI PART NO	DESCRIPTION	
VR	1	RV616172	RJC096P103	REPRO. LEVEL
	2	RV616172	RJC096P103	SEL. REP. LEVEL
	3	RV623276	PM822H202V	REP. EQ. HIGH
	4	RV653218	PM822H502V	REP. EQ. MID
	5	RV653218	PM822H502V	REP. EQ. LOW
	6	RV654176	RJC096P503	LOW FREQ. COMP
	7	RV616172	RJC096P103	OUTPUT SRL
	8	RV653206	PM822H502H	OUTPUT LEVEL
	9	RV654210	PM822H503H	PEAK TRIGGER LEVEL
	10	RV626208	PM822H203H	TEST OSC LEVEL
	11	RV626193	RJC096P203	INPUT SENSITIVITY
	12	RV616192	RJC096P103	INPUT SRL
	13	RV654272	PM822H503V	REC. EQ HIGH
	14	RV654272	PM822H503V	REC. EQ MID
	15	RV654272	PM822H503V	REC. EQ. LOW
	16	RV616172	RJC096P103	REC LEVEL
	17	RV624270	PM822H203V	PHASE COMP HIGH
	18	RV624270	PM822H203V	PHASE COMP MID
	19	RV624270	PM822H203V	PHASE COMP LOW
	20	RV654176	RJC096P503	RECORD BIAS
	21	RV632202	PM822H501H	ERASE SYMMETRY
RL	1	RY27C052	G2V-2-DC5V	REC. RELAY
	2	RY1YC023	DR211A0005	N.R. REMOTE RELAY
SW	1	WM32003	SW293-1-22	LOW FREQ. COMP
	2	WM31016	SS5012	LINE OUTPUT MODE
T	1, 2	TF31019		

※

REF NO / ASSY	PB-14XB	PB-14XBA	
VR	MTR-10 FL, EL, DL, AL, JL, ML, KL	MTR-10 AL, MTR-10 BL	
C2	47P	open	
C77	0.0012μ /630V	330P /630V	

REF NO / ASSY	PB-14XB	PB-14XBA	
C76	0.0012μ /630V	0.0018μ /630V	
R37	2.2M	open	
R115	220 (1W)	150 (2W)	
R140	180 (2W)	150 (2W)	

REF NO / ASSY	PB-14XB	PB-14XBA	
T1 Bias Output	pin No. 8	pin No. 7	

TYPE NO (G) TO ( ) AT THE END

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, 1/4 W, 5%
2. CAPACITANCE VALUES ARE IN FARADS, 50V
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS
- ⊕ ALUMINIUM ELECTROLYTIC CAPACITOR
- B BIPOLAR ALUMINIUM ELECTROLYTIC CAPACITOR
- F MYLAR FILM CAPACITOR ±5% 50V
- S POLYSTYRENE FILM CAPACITOR ±5% 50V
- C CERAMIC CAPACITOR
- M MICA CAPACITOR ±5%
- T TANTALUM ELECTROLYTIC CAPACITOR
- P POLYPROPYLENE FILM CAPACITOR ±5%
- L LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR
- ▪ METALLIZED PAPER CAPACITOR ±10%
- SPARK KILLER
- ⚠ SAFETY COMPONENT. REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON
- REFER ... 3828.

THIS SCHEMATIC DIAGRAM IS APPLIED TO PB-14XB (PB-15W) PB-14XBC (PB-15W)

OTARI Otari Electric Co., Ltd.
NAME: AUDIO AMPLIFIER PCB Assy
PART NO: PB1500A
THIRD ANGLE PROJECTION

3.10157

NO.	DWG. NO	PART NO	DESCRIPTION	QTY	REMARKS

元図	生產図	取扱図	TYPE
2-6354	2-6355	3-13828	

Ass'y No.	PB-14XA	PB-14XAH	PB-14XAC	PB-14XAE	PB-14XAF	PB-14XAG	PB-14XB	PB-14XBB	PB-14XBC	PB-14XCB	PB-14XCC	PB-14XDA	PB-14XEA
Use / Ref No.	MTR-12-4 -12-L	MTR-10-G -H	MTR-10-4* I* IAB*	MTR-10II-K C,H,U,2 2T,CT etc	BTR-10J-FX -FZ	BTR-10J-2X -2Z	MTR-10-4L* LL*	MTR-10-2LL 2L CL MTR-10II-2L CL	MTR-10-AL BL	BTR-10J-F	BTR-10J-2	BTR-10J-FP	MTR-12II -MTK
R1	150K	150K	150K	150K	150K	150K	150K	150K	150K	150K	150K	150K	150K
R2	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K
R35	2.2M	Open	2.2M	open	open	open	Open	Open	Open	open	Open	open	open
R36	390K	1.2M	390K	1.2M	1.2M	1.2M	390K	Open	Open	Open	open	open	1.2M
R37	1.5M	Open	1.5M	Open	Open	Open	2.2M	Open	Open	Open	open	open	open
R39	Short	Short	short	Short	Short	Short	2.0K	2.0K	2.0K	2.0K	2.0K	2.0K	short
R40	1.5K	680	680	1.5K	1.5K	1.5K	2.4K	2.4K	2.4K	2.4K	2.4K	2.4K	1.5K
R41	2.0K	2.0K	2.0K	2.0K	2.0K	2.0K	3.3K	3.3K	3.3K	3.3K	3.3K	3.3K	2.0K
R42	2.4K	2.4K	2.4K	2.4K	2.4K	2.4K	4.3K	4.3K	4.3K	6.2K	4.3K	4.3K	2.4K
R43	3.3K	3.3K	3.3K	3.3K	3.3K	3.3K	short	short	Short	Short	short	Open	3.3K
R44	4.3K	4.3K	4.3K	4.3K	4.3K	4.3K	7.5K	7.5K	7.5K	7.5K	7.5K	Open	4.3K
R63	10K	10K	10K	10K	100K	10K	10K	10K	10K	10K	10K	10K	10K
R73	33K	33K	33K	33K	330K	33K	33K	33K	33K	33K	33K	33K	33K
R128	20K	20K	20K	20K	200K	20K	20K	20K	20K	20K	20K	Open	Open
R147	10K	10K	10K	10K	100K	10K	10K	10K	10K	10K	10K	Open	Open
R149	27K	27K	27K	27K	270K	27K	27K	27K	27K	27K	27K	Open	Open
R150	180K	180K	180K	180K	1.8M	180K	180K	180K	180K	180K	180K	Open	Open
R151	47K	47K	47K	47K	470K	47K	47K	47K	47K	47K	47K	Open	Open
R160	33K	33K	33K	33K	33K	33K	15K	15K	15K	15K	15K	Open	Open
R165	Open	Open	Open	Open	Open	Open	6.8K	6.8K	6.8K	6.8K	6.8K	Open	Open
R167	15K	15K	15K	15K	15K	15K	10K	10K	10K	10K	10K	Open	Open
R168	6.8K	6.8K	6.8K	6.8K	6.8K	6.8K	11K	11K	11K	11K	11K	Open	Open
R169	47K	47K	47K	47K	47K	47K	43K	43K	43K	43K	43K	Open	Open
R172	6.8K	6.8K	6.8K	6.8K	6.8K	6.8K	2.7K	2.7K	2.7K	2.7K	2.7K	Open	Open
R179	2.7K	2.7K	2.7K	2.7K	2.7K	2.7K	1.5K	1.5K	1.5K	1.5K	1.5K	Open	Open
R198	1K	680	1K	1K	680	1K	1K	1K	1K	1K	1K	Open	Open
R215	220(1W)	220(1W)	220(1W)	220(1W)	100(2W)	220(1W)	220(1W)	220(1W)	100(2W)	100(2W)	220(1W)	Open	Open
R240	180(2W)	100(2W)	180 or 270(2W)*	180(2W)	100(2W)	180(2W)	180 or 270(2W)*	180(2W)	100(2W)	100(2W)	180(2W)	Open	Open
C2	47P	47P	47P	47P	Open	47P	47P	47P	Open	Open	47P	Open	47P
C64	33P	33P	33P	33P	Open	33P	33P	33P	33P	33P	33P	Open	Open
C75	100P	120P	100P	100P	100P	100P	120P	120P	120P	120P	120P	Open	Open
C76	Open	Open	Open	Open	Open	Open	680P	330P	330P	330P	330P	Open	Open
C77	0.0068µ	0.0068µ	0.0068µ	0.0068µ	0.0068µ	0.0068µ	0.01µ	0.01µ	0.01µ	0.01µ	0.01µ	Open	Open
C78	120P	120P	120P	120P	120P	120P	180P	180P	180P	100P	180P	Open	Open
C79	680P	680P	680P	330P	330P	330P	0.0015µ	680P	680P	680P	680P	Open	Open
C80	0.01µ	Open	0.01µ	0.01µ	0.01µ	0.01µ	0.022µ	0.01µ	0.01µ	0.01µ	0.01µ	Open	Open
C81	180P	180P	180P	180P	180P	180P	470P	180P	180P	180P	180P	Open	Open
C82	0.0015µ	0.0015µ	0.0015µ	680P	680P	680P	0.0022µ	0.0015µ	0.0015µ	0.0015µ	0.0015µ	Open	Open
C92	0.0012µ/630V	0.0022µ/630V	0.0012µ/630V	0.0012µ/630V	680P/630V	0.0012µ/630V	0.0012µ/630V	0.0012µ/630V	680P/630V	680P/630V	0.0012µ/630V	Open	Open
C94	0.0012µ/630V	0.0022µ/630V	0.0012µ/630V	0.0012µ/630V	0.0015µ/630V	0.0012µ/630V	0.0012µ/630V	0.0012µ/630V	0.00[illegible]µ/630V	0.0018µ/630V	0.0012µ/630V	Open	Open
C99	0.1µ	0.1µ	0.1µ	0.1µ	0.1µ	0.1µ	0.1µ	0.1µ	0.1µ	0.1µ	0.1µ	Open	Open
VR3	2K(B)	2K(B)	2K(B)	2K(B)	2K(B)	2K(B)	5K(B)	5K(B)	5K(B)	5K(B)	5K(B)	5K(B)	2K(B)
VR5	5K(B)	5K(B)	5K(B)	5K(B)	5K(B)	5K(B)	10K(B)	10K(B)	10K(B)	open	open	Open	5K(B)
VR12	10K	10K	10K	10K	Open	Open	10K	10K	10K	10K	10K	Open	Open
VR15	50K	50K	50K	50K	50K	50K	50K	50K	50K	Open	Open	Open	Open
VR19	20K	20K	20K	20K	20K	20K	20K	20K	20K	Open	Open	Open	Open
J1	H	H	H	H	H	H	L	L	L	L	L	Open	H
J2	H	H	H	H	H	H	L	L	L	L	L	Open	H
J3	H	H	H	H	H	H	L	L	L	L	L	Open	Open
J4	H	H	H	H	H	H	L	L	L	L	L	Open	Open
T1 BIAS OUTPUT	Pin 8	Pin 8	Pin 8	Pin 8	Pin 7	Pin 8	Pin 8	Pin 8	Pin 7	Pin 7	Pin 8	—	—

NOTES

1. The values of the components those not specified above are common to all assemblies.
2. Resistance values are in ohms, 0.25W, 5%
3. Capacitance values are in farads, 50V, 5%
4. The value of *R240 of MTR-10-4, I, IAB, 4L, and IL follows the next table

d	*R240
1.0mm (0.039")	270(2W)
1.7mm (0.067")	180(2W)

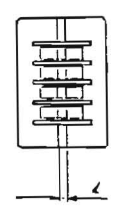


FIG.1
1/2" 4 TRACK
ERASE HEAD

TYPE NO(G)TO ( )AT THE END

SURFACE FINISH 仕上	指示無き個所 C
	≡ 50S 12 5S

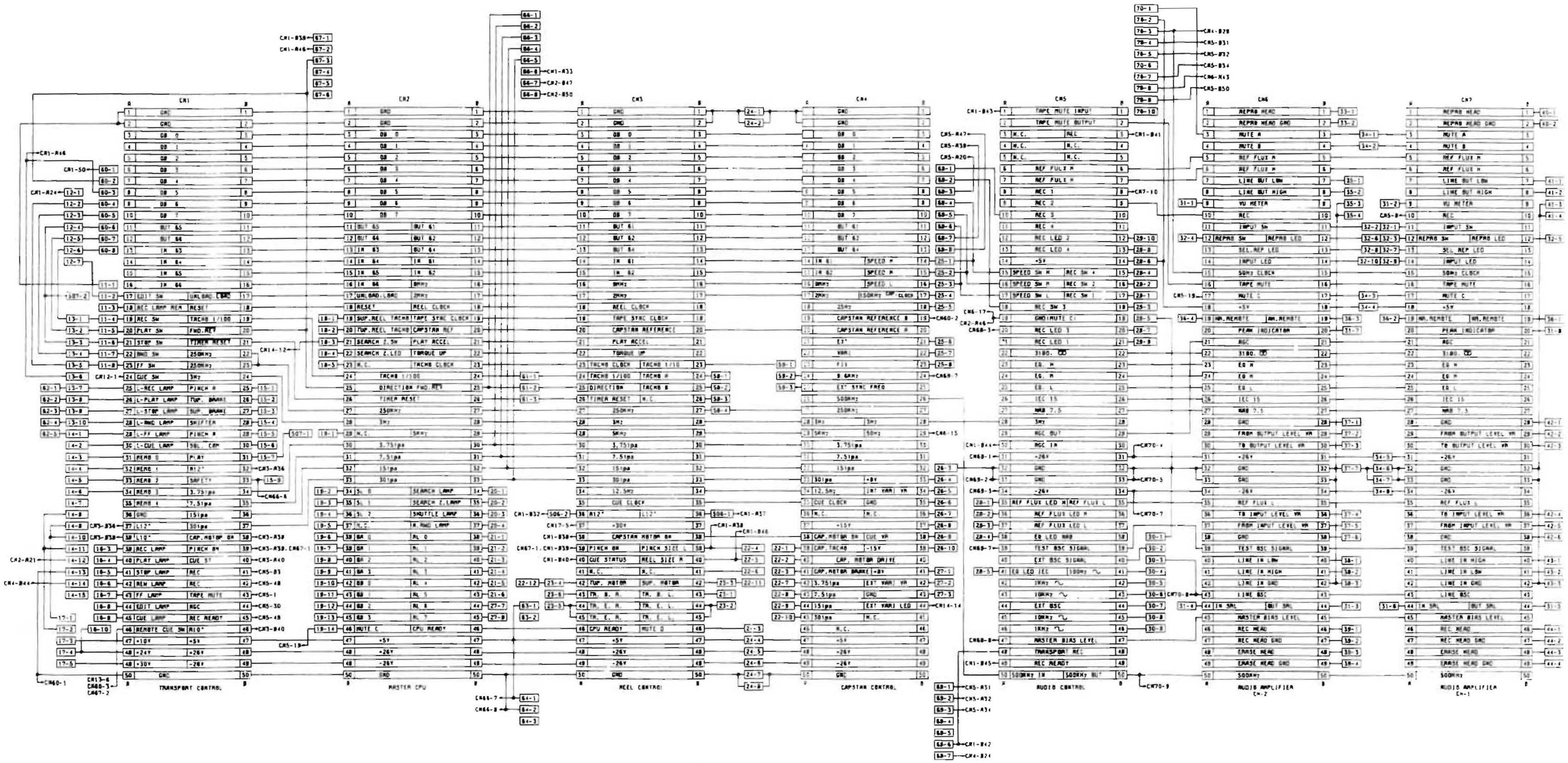
OTARI Otari Electric Co., Ltd.

ASS'Y NO 型式

PART NAME 品名 AUDIO AMP PCA (MTR-10-4-I)

DWG NAME 図名 定数一覧表

3 13828



CN NO.	OTARI PART NO.	DESCRIPTION		DESTINATION
1	CN3A0127	PC-10082T	D	TRANSPORT CONTROL P.C.B. ASS'Y
2	CN3A0127	PC-10082T	D	MASTER CPU P.C.B. ASS'Y
3	CN3A0127	PC-10082T	D	REEL CONTROL P.C.B. ASS'Y
4	CN3A0127	PC-10082T	D	CAPSTAN CONTROL P.C.B. ASS'Y
5	CN3A0127	PC-10082T	D	AUDIO CONTROL P.C.B. ASS'Y
6	CN3A0127	PC-10082T	D	AUDIO AMPLIFIER P.C.B. ASS'Y (2)
7	CN3A0127	PC-10082T	D	AUDIO AMPLIFIER P.C.B. ASS'Y (1)
8	—	—		—
9	—	—		—
10	—	—		—
11	CN408354	IL-8P-S3EN2	R	TRANSPORT REMOTE CONTROL
12	CN407355	IL-7P-S3EN2	T	CONTROL SWITCH
13	CN410228	FRP-10M	R	LOCATOR
14	CN415228	FRP-15M	R	LOCATOR
15	CN408357	IL-8P-S3EN2	T	SOLENOIDES
16	CN410358	IL-10P-S3EN2	T	LAMPS
17	CN405353	IL-5P-S3EN2-(A)	P	POWER SUPPLY
18	CN405353	IL-5P-S3EN2-(B)	T	
19	CN415228	FRP-15M	R	LOCATOR
20	CN405226	FRP-5M	R	LOCATOR
21	CN408227	FRP-8M	R	LOCATOR
22	CN412881	IL-12P-S3EN2	T	REEL SIZE
23	CN408354	IL-8P-S3EN2	R	POWER TRANSISTOR
24	CN408356	IL-8P-S3EN2	P	POWER SUPPLY
25	CN408354	IL-8P-S3EN2	T	SPEED SW.SPEED MODE SW
26	CN410358	IL-10P-S3EN2	T	CUE & PITCH CONTROL VR
27	CN403225	FRP-3M	R	LOCATOR
28	CN405353	IL-5P-S3EN2	R	REF FLUX & EQ LED

CN NO.	OTARI PART NO.	DESCRIPTION		DESTINATION
29	CN310137	HIF3-10P-2.54DSA	R	REC SW & LED
30	CN408357	IL-8P-S3EN2	R	TEST OSC SW
31	CN408358	IL-8P-S3EN2	R	SAL SW.PEAK INDICATOR
32	CN310137	HIF3-10P-2.54DSA	R	MODE CONTROL SW & LED
33	CN402350	IL-2P-S3EN2	T	REPRO HEAD (2)
34	CN408358	IL-8P-S3EN2	P	POWER SUPPLY
35	CN404352	IL-4P-S3EN2	R	LINE OUTPUT (2)
36	CN405228	FRP-5M	R	NOISE REDUCTION REMOTE
37	CN407355	IL-7P-S3EN2	R	INPUT & OUTPUT LEVEL VR (2)
38	CN403351	IL-3P-S3EN2	R	LINE INPUT (2)
39	CN404352	IL-4P-S3EN2	R	ERASE & REC HEAD (2)
40	CN402350	IL-2P-S3EN2	T	REPRO HEAD (1)
41	CN404352	IL-4P-S3EN2	R	LINE OUTPUT (1)
42	CN408354	IL-8P-S3EN2	R	INPUT & OUTPUT LEVEL VR (1)
43	CN403351	IL-3P-S3EN2	R	LINE INPUT (1)
44	CN404352	IL-4P-S3EN2	T	ERASE & REC HEAD (1)
58	CN404352	IL-4P-S3EN2	T	ROLLER TACHO
59	CN403225	FRP-3M	R	PARALLEL I/O
60	CN408227	FRP-8M	R	PARALLEL I/O
61	CN403351	IL-3P-S3EN2	T	TAPE TIMER
62	CN405226	FRP-5M	R	PARALLEL I/O
63	CN402350	IL-2P-S3EN2	R	PARALLEL I/O
64	CN403351	IL-3P-S3EN2	P	POWER SUPPLY
66	CN408354	IL-8P-S3EN2	R	I/O BACK UP PCA
67	CN408354	IL-8P-S3EN2	TS	TIMER CODE PCA
68	CN408354	IL-8P-S3EN2	TS	TIMER CODE PCA
69	CN407355	IL-7P-S3EN2	RS	RESOLVER
70	CN410358	IL-10P-S3EN2	TS	TIMER CODE PCA

— DESTINATION —

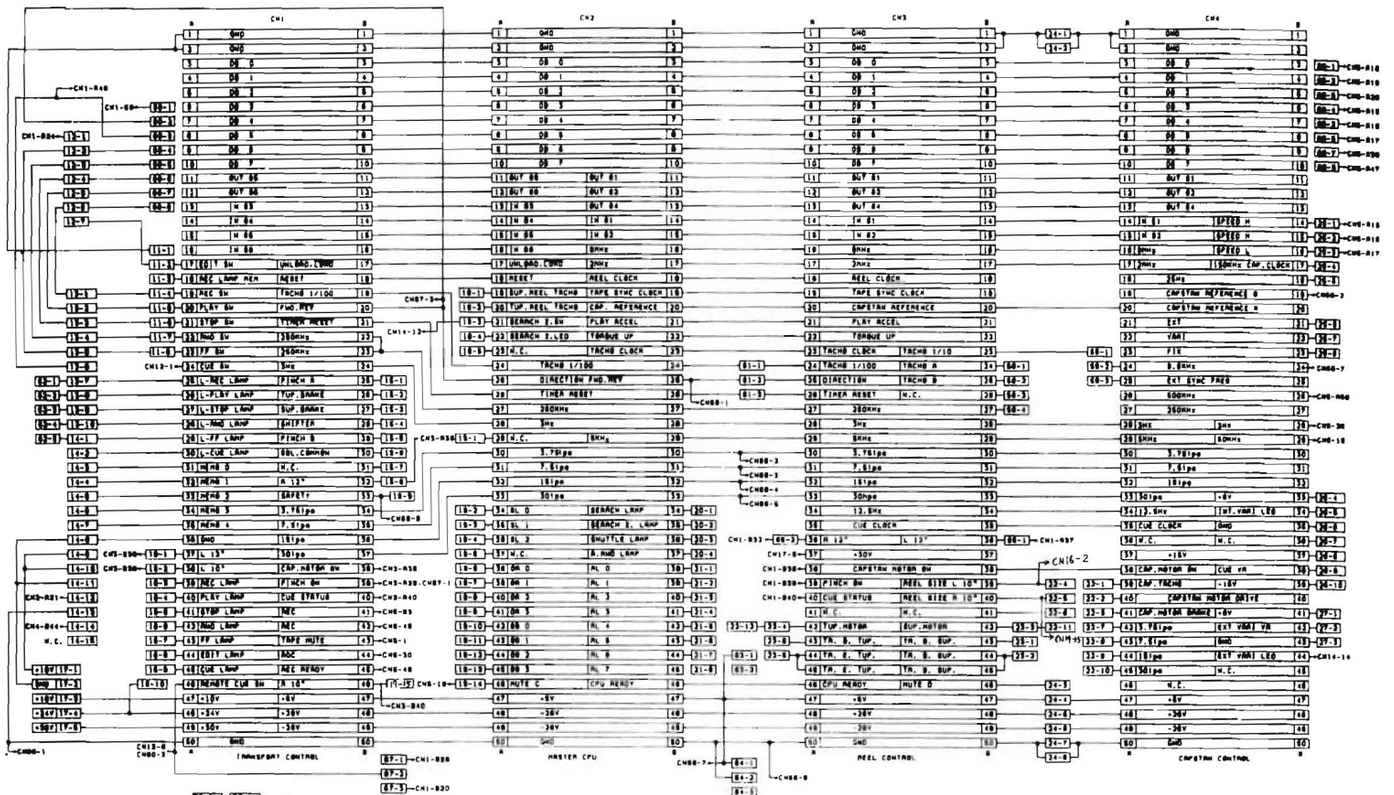
D : DAUGHTER BOARD
. : REAR PANEL
T : TRANSPORT ASS'Y
P : POWER SUPPLY ASS'Y
R : AMPLIFIER CONTROL ASS'Y
TS: SUB MOTHER P.C.B. ASS'Y(T.C.)
RS: EDGE CN P.C.B. ASS'Y(RESOLVER)

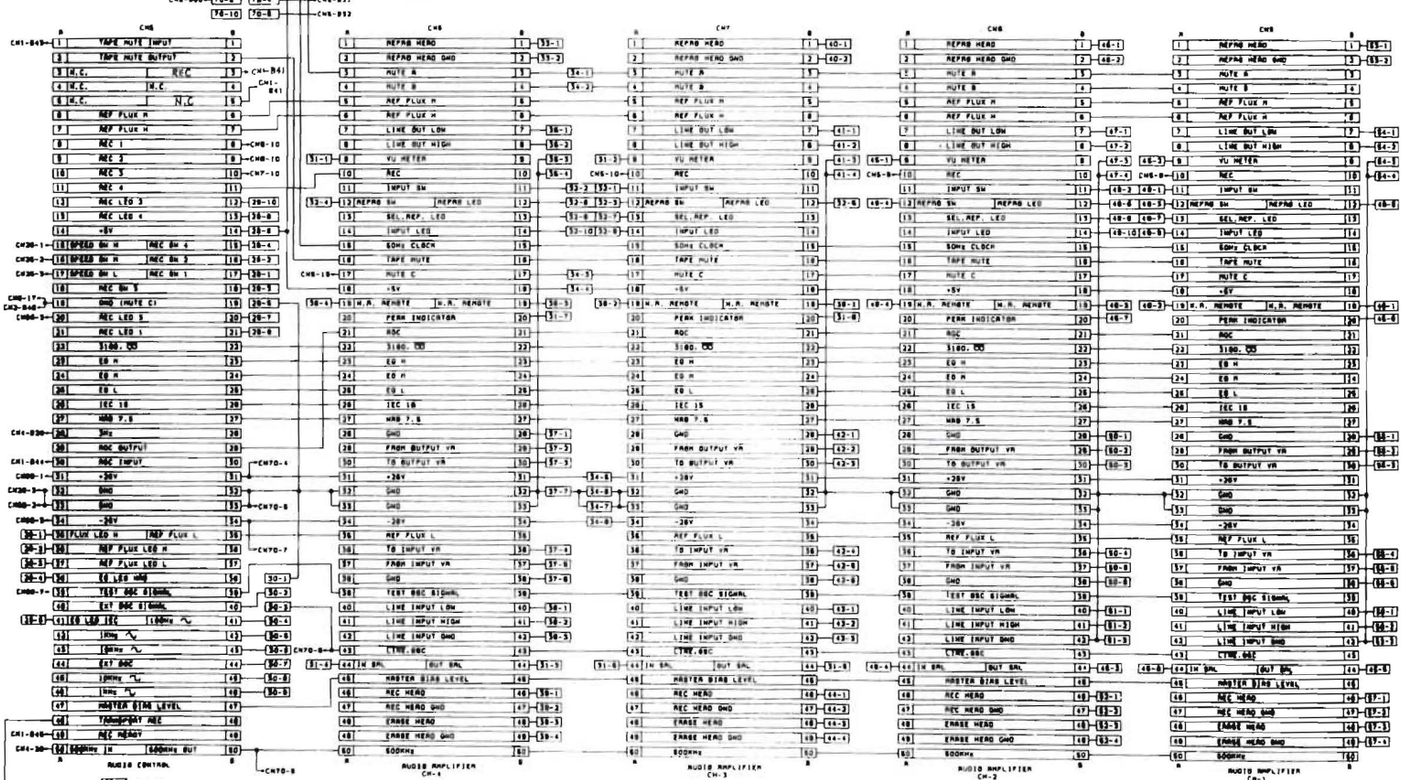
NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. CAPACITANCE VALUES ARE IN FARADS, 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
: ALUMINUM ELECTROLYTIC CAPACITOR.
: BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
: MYLAR FILM CAPACITOR(±5%, 50V)
: POLYSTYRENE FILM CAPACITOR(±5%, 50V)
: CERAMIC CAPACITOR.
: MICA CAPACITOR(±5%)
: TANTALUM ELECTROLYTIC CAPACITOR.
: POLYPROPYLENE FILM CAPACITOR(±5%)
: LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR
: METALLIZED PAPER CAPACITOR(±10%)
: [illegible]
4. : SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

TYPE NO(A)TO
( )AT THE END

NAME	MOTHER PCA
PART NO.	PB7550A

DWG. NO. 3 . 10313





CN NO.	ATARI PART NO.	DESCRIPTION	DESTINATION
1	CN5A0137	FC-100B2T	D : TRANSPORT CONTROL P.C.B. ASS'Y
2	CN5A0137	FC-100B2T	D : MASTER CPU P.C.B. ASS'Y
3	CN5A0137	FC-100B2T	D : REEL CONTROL P.C.B. ASS'Y
4	CN5A0137	FC-100B2T	D : CAPSTAN CONTROL P.C.B. ASS'Y
5	CN5A0137	FC-100B2T	D : AUDIO CONTROL P.C.B. ASS'Y
6	CN5A0137	FC-100B2T	D : AUDIO AMPLIFIER P.C.B. ASS'Y (4)
7	CN5A0137	FC-100B2T	D : AUDIO AMPLIFIER P.C.B. ASS'Y (3)
8	CN5A0137	FC-100B2T	D : AUDIO AMPLIFIER P.C.B. ASS'Y (2)
9	CN5A0137	FC-100B2T	D : AUDIO AMPLIFIER P.C.B. ASS'Y (1)
10			
11	CN4008360	IL-8P-83EW3	A : TRANSPORT REMOTE CONTROL
12	CN4017365	IL-7P-83EW3	T : CONTROL SWITCH
13	CN4102230	FRP-10M	A : LOCATOR
14	CN4102230	FRP-16M	A : LOCATOR
15	CN4008387	IL-8P-83EW3	T : SOLENOIDS
16	CN4103360	IL-10P-83EW3	T : LAMPS
17	CN4008383	IL-8P-83EW3	P : POWER SUPPLY
18	CN4008383	IL-8P-83EW3	T : REEL TACHO
19	CN4102230	FRP-18M	A : LOCATOR
20	CN4102230	FRP-9M	A : LOCATOR
21	CN4108227	FRP-8M	A : LOCATOR
22	CN4112051	IL-12P-83EW3	T : REEL SIZE
23	CN4008384	IL-8P-83EW3	A : POWER TRANSISTOR
24	CN4008386	IL-8P-83EW3	P : POWER SUPPLY
25	CN4008388	IL-8P-83EW3	T : SPEED SW, SPEED MODE SW
26	CN4102860	IL-8P-83EW3	T : CUE & PITCH CONTROL VR
27	CN4013226	FRP-3M	A : LOCATOR
28	CN4008383	IL-8P-83EW3	A : REF FLUX & EQ LED
29	CN5J0137	HIF3-10P-2.54DSA	A : REC SWITCH & LED
30	CN4008387	IL-8P-83EW3	A : TEST OSC SWITCH
31	CN4008388	IL-8P-83EW3	A : SAL SW, PEAK INDICATOR (3)(4)
32	CN5J0137	HIF3-10P-2.54DSA	A : MODE CONTROL SW LED (3)(4)
33	CN4013360	IL-2P-83EW3	T : REPRO HEAD (4)
34	CN4008388	IL-8P-83EW3	P : POWER SUPPLY
35	CN4008383	IL-8P-83EW3	A : LINE OUTPUT (4)

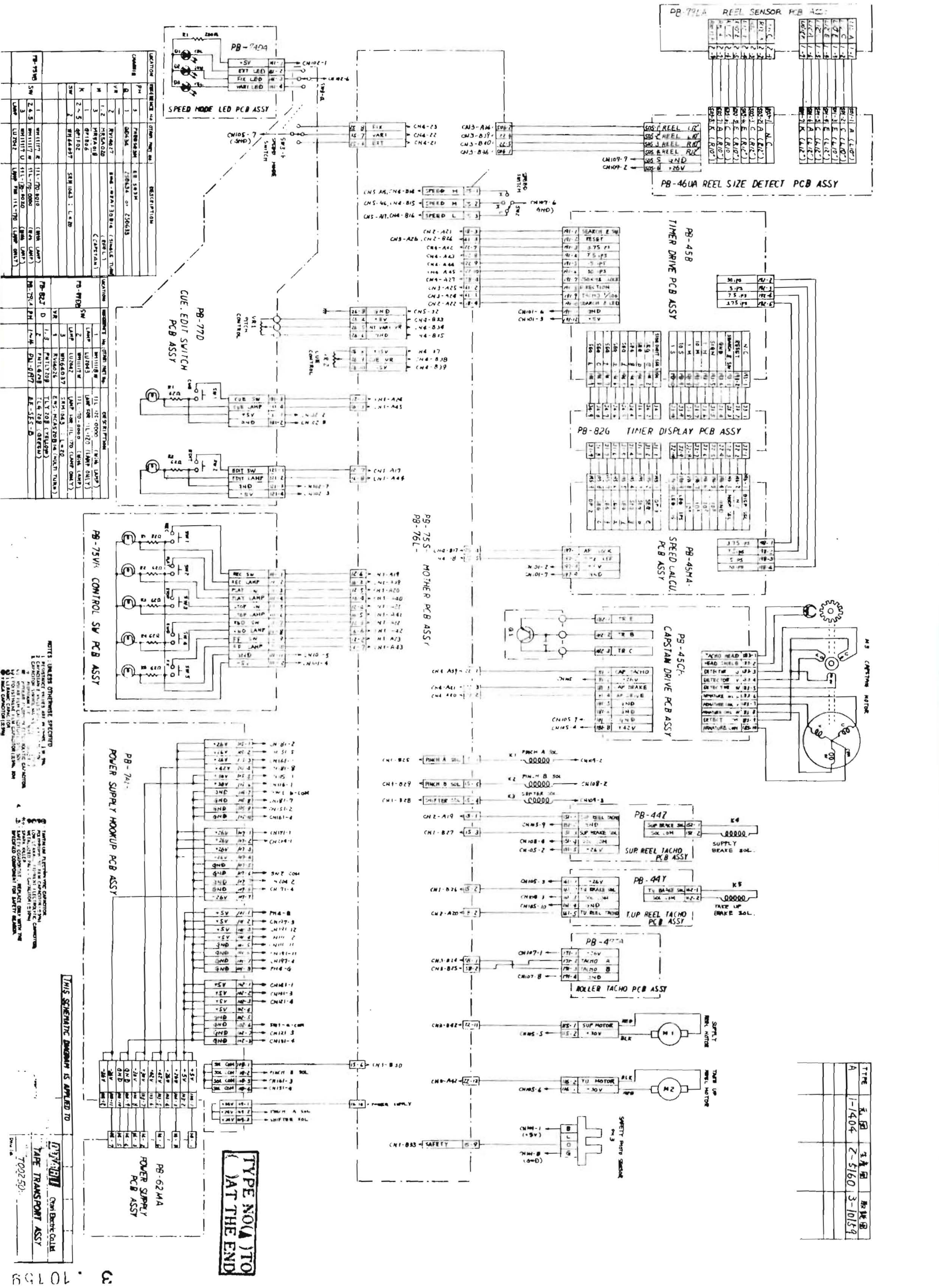
CN NO.	ATARI PART NO.	DESCRIPTION	DESTINATION
36	CN4013226	FRP-8M	A : NOISE REDUCTION REMOTE (3)(4)
37	CN4017366	IL-7P-83EW3	A : INPUT & OUTPUT LEVEL VR (4)
38	CN4013361	IL-3P-83EW3	A : LINE INPUT (4)
39	CN4013362	IL-4P-83EW3	T : ERASE & REC HEAD (4)
40	CN4013360	IL-2P-83EW3	T : REPRO HEAD (3)
41	CN4013362	IL-4P-83EW3	A : LINE OUTPUT (3)
42	CN4008384	IL-8P-83EW3	A : INPUT & OUTPUT VR (3)
43	CN4013361	IL-3P-83EW3	A : LINE INPUT (3)
44	CN4013362	IL-4P-83EW3	T : ERASE & REC HEAD (3)
45	CN4008388	IL-8P-83EW3	A : SAL SW, PEAK INDICATOR (1)(2)
46	CN4013360	IL-2P-83EW3	T : REPRO HEAD (2)
47	CN4013362	IL-4P-83EW3	A : LINE OUTPUT (2)
48	CN4008227	FRP-8M	A : NOISE REDUCTION REMOTE (1)(2)
49	CN5J0137	HIF3-10P-2.54DSA	A : MODE CONTROL SW LED (1)(2)
50	CN4008384	IL-8P-83EW3	A : INPUT & OUTPUT VR (2)
51	CN4013361	IL-3P-83EW3	A : LINE INPUT (2)
52	CN4013362	IL-4P-83EW3	T : ERASE & REC HEAD (2)
53	CN4013360	IL-2P-83EW3	T : REPRO HEAD (1)
54	CN4013362	IL-4P-83EW3	A : LINE OUTPUT (1)
55	CN4008384	IL-8P-83EW3	A : INPUT & OUTPUT VR (1)
56	CN4013361	IL-3P-83EW3	A : LINE INPUT (1)
57	CN4013362	IL-4P-83EW3	T : ERASE & REC HEAD (1)
58	CN4013362	IL-4P-83EW3	T : ROLLER TACHO
59	CN4013226	FRP-3M	A : PARALLEL I/O
60	CN4008227	FRP-8M	A : PARALLEL I/O
61	CN4013361	IL-3P-83EW3	T : TAPE TIMER
62	CN4013226	FRP-8M	A : PARALLEL I/O
63	CN4013360	IL-2P-83EW3	A : PARALLEL I/O
64	CN4013361	IL-3P-83EW3	A : PARALLEL I/O
65	CN4013360	IL-2P-83EW3	T : REEL SIZE
66	CN4008386	IL-8P-83EW3	A : I/O HOOK UP PCB
67	CN4008384	IL-8P-83EW3	T : CTIME CODE PCB
68	CN4008388	IL-8P-83EW3	T : CTIME CODE PCB
69	CN4017368	IL-7P-83EW3	A : RESOLVER
70	CN4012368	IL-10P-83EW3	T : CTIME CODE PCB

D : DAUGHTER BOARD
A : MEMO PANEL
T : TAPE TRANSPORT ASS'Y
P : POWER SUPPLY ASS'Y
B : AMPLIFIER CONTROL ASS'Y
(5) : SUB MOTHER P.C.B. ASS'Y(T.T.C.)
(8) : EDGE CN P.C.B. ASS'Y(RESOLVER)

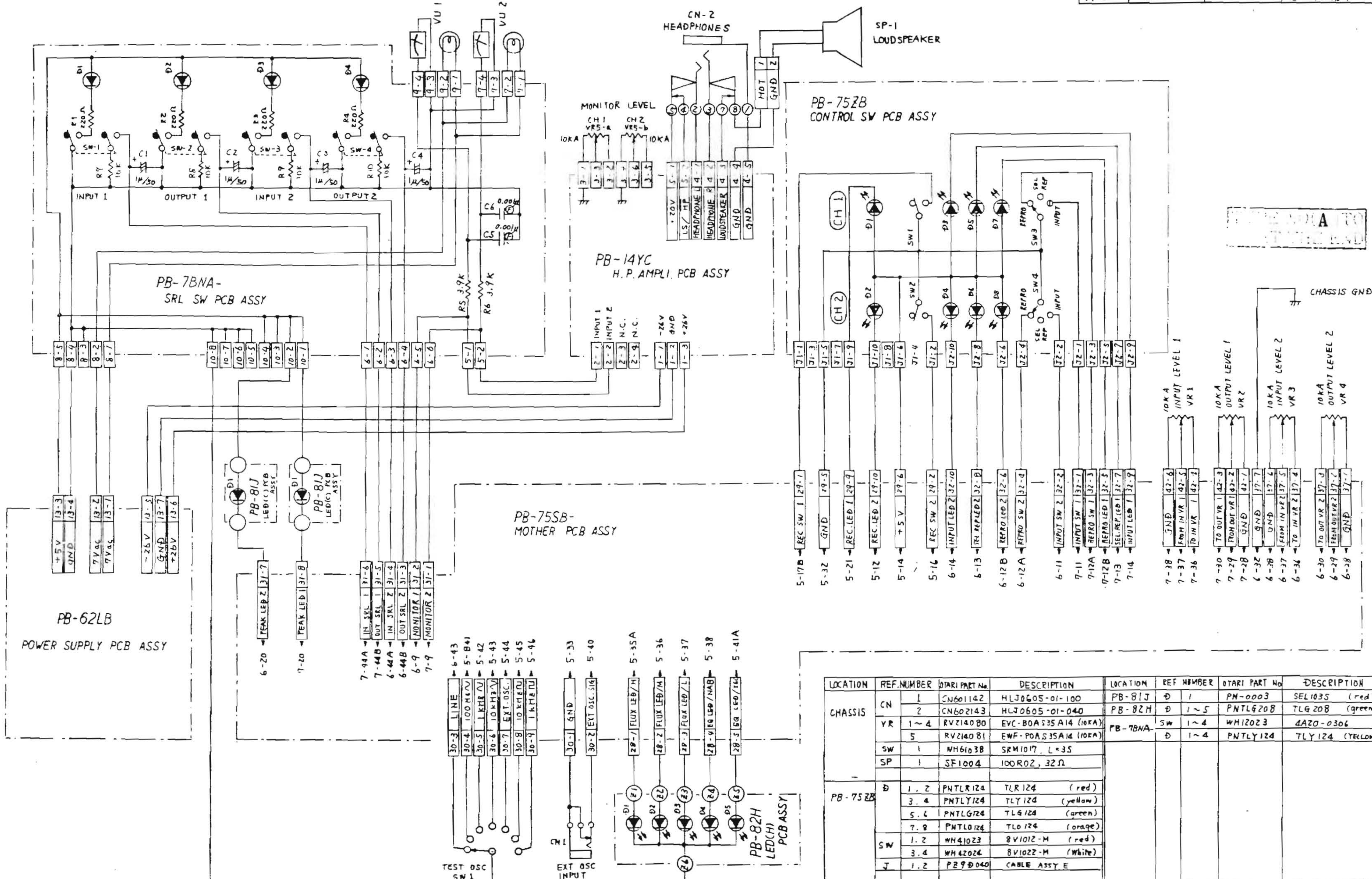
NAME	PART NO.	APPLIED
MOTHER PCA	PB-76L0A	

TYPE NO. ▲ TO (AT THE END

DWG. NO. 3.10314



PB-79LA REEL SENSOR PCB ASSY
PB-740A
SPEED MODE LED PCB ASSY
PB-46UA REEL SIZE DETECT PCB ASSY
PB-45B TIMER DRIVE PCB ASSY
PB-77D CUE. EDIT SWITCH PCB ASSY
PB-826 TIMER DISPLAY PCB ASSY
PB-75S- PB-76L- MOTHER PCB ASSY
PB-45MA- SPEED CALCU. PCB ASSY
PB-75VK CONTROL SW PCB ASSY
PB-45CK- CAPSTAN DRIVE PCB ASSY
PB-74 POWER SUPPLY HOOKUP PCB ASSY
PB-44Z SUP REEL TACHO PCB ASSY
PB-44Y T.UP REEL TACHO PCB ASSY
ROLLER TACHO PCB ASSY
PB-62MA POWER SUPPLY PCB ASSY
THIS SCHEMATIC DIAGRAM IS APPLIED TO
TAPE TRANSPORT ASSY
TYPE NO( )TO ( )AT THE END



LOCATION	REF.NUMBER		OTARI PART No.	DESCRIPTION
CHASSIS	CN	1	CN601142	HLJ0605-01-100
		2	CN602143	HLJ0605-01-040
	VR	1~4	RV214080	EVC-B0A535A14 (10KA)
		5	RV214081	EWF-P0A535A14 (10KA)
	SW	1	WH61038	SRM1017, L=35
	SP	1	SF1004	100R02, 32Ω
PB-75ZB	D	1, 2	PNTLR124	TLR124 (red)
		3, 4	PNTLY124	TLY124 (yellow)
		5, 6	PNTLG124	TLG124 (green)
		7, 8	PNTLO124	TLO124 (orage)
	SW	1, 2	WH41023	8V1012-M (red)
		3, 4	WH42024	8V1022-M (White)
	J	1, 2	PZ9D040	CABLE ASSY E

LOCATION	REF NUMBER		OTARI PART No	DESCRIPTION
PB-81J	D	1	PN-0003	SEL103S (red)
PB-82H	D	1~5	PNTLG208	TLG208 (green)
PB-7BNA-	SW	1~4	WH12023	4A20-0306
	D	1~4	PNTLY124	TLY124 (YELLOW)

NOTES : UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS. 1/4 W. 5%.
2. CAPACITANCE VALUES ARE IN FARADS. 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
- ALUMINUM ELECTROLYTIC CAPACITOR.
- BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
- MYLAR FILM CAPACITOR (±5%, 50V)
- POLYSTYRENE FILM CAPACITOR (±5%, 50V)
- CERAMIC CAPACITOR
- TANTALUM ELECTROLYTIC CAPACITOR.
- POLYPROPYLENE FILM CAPACITOR (±5%)
- LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
- METALLIZED PAPER CAPACITOR (±10%)
- SPARK KILLER.

4. Δ : SAFETY COMPONENT ; REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

THIS SCHEMATIC DIAGRAM IS APPLIED TO

TYPE	元図	生産図	取説図
A~	Z-		3-10151

MODEL MTR10 Z

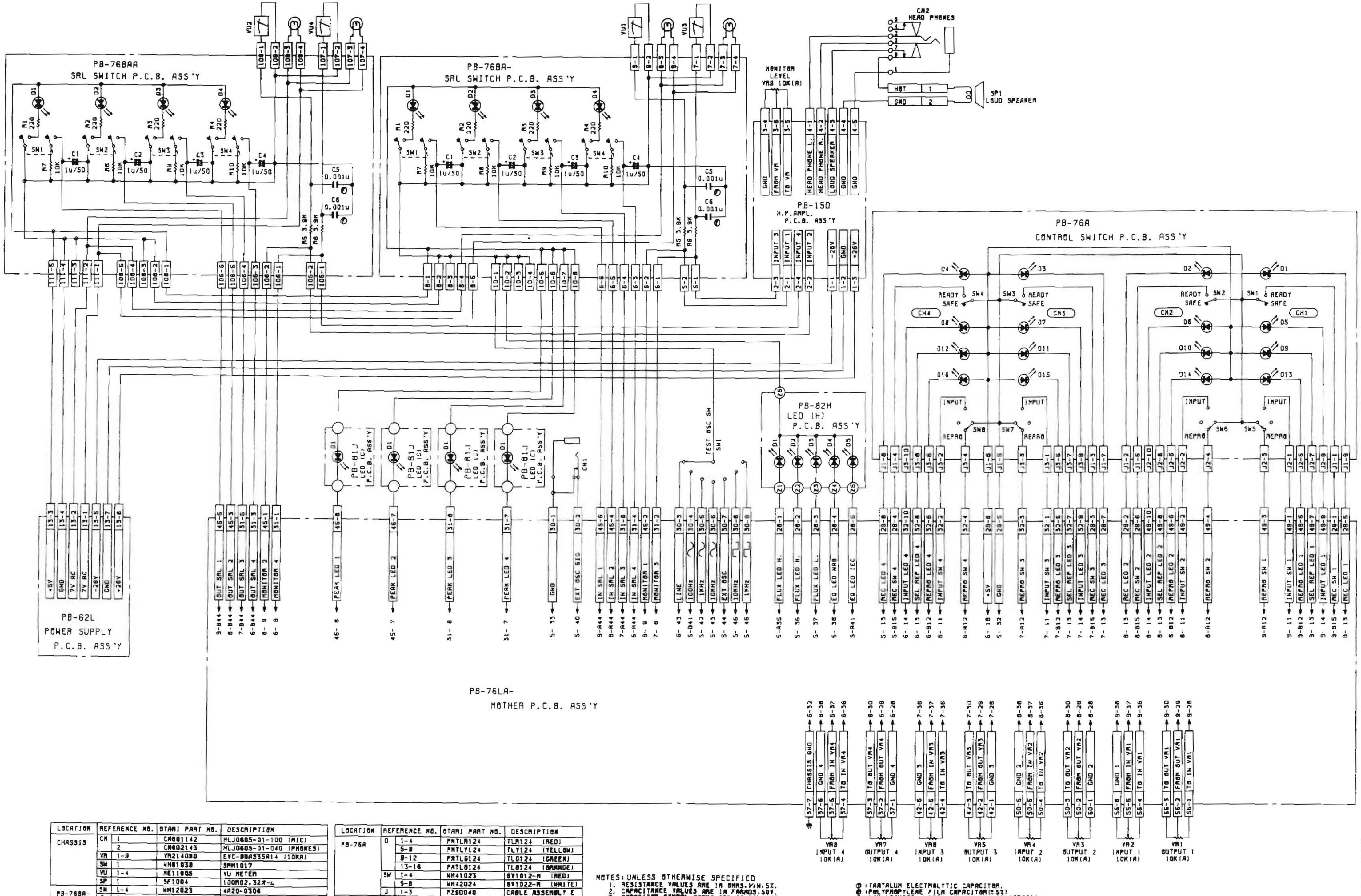
DRAWN / DESIGNED / CHECKED / APPROVED

OTARI Otari Electric Co.,Ltd.

NAME AUDIO CONTROL ASS'Y

PART No. CB7B10A

DWG. No. 3 .10151

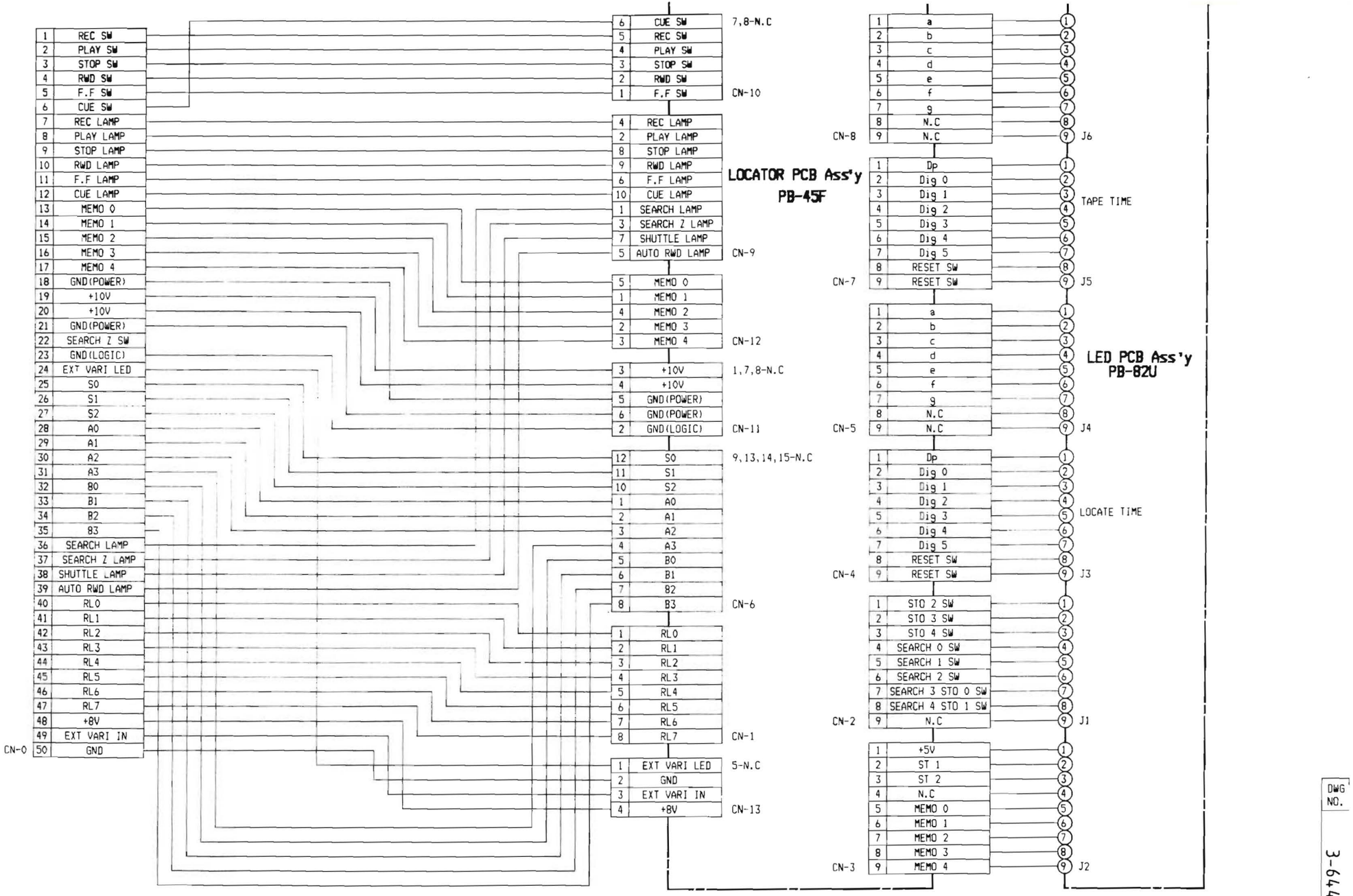


LOCATION	REFERENCE NO.		OTARI PART NO.	DESCRIPTION
CHASSIS	CN	1	CN601142	HLJ0605-01-100 (MIC)
		2	CN602143	HLJ0605-01-040 (PHONES)
	VR	1-9	VR214080	EVC-B0AS35A14 (10KA)
	SW	1	WH61038	SRM1017
	VU	1-4	ME11005	VU METER
	SP	1	SF1004	100R02.32ネ-ム
PB-76BA-	SW	1-4	WN12023	4A20-0306
	D	1-4	PNTLY124	TLY124 (YELLOW)
PB-76BAA	SW	1-4	WN12023	4A20-0306
	D	1-4	PNTLY124	TLY124 (YELLOW)

LOCATION	REFERENCE NO.		OTARI PART NO.	DESCRIPTION
PB-76A	D	1-4	PNTLR124	TLR124 (RED)
		5-8	PNTLY124	TLY124 (YELLOW)
		9-12	PNTLG124	TLG124 (GREEN)
		13-16	PNTLO124	TLO124 (ORANGE)
	SW	1-4	WN41023	BY1012-M (RED)
		5-8	WN42024	BY1022-M (WHITE)
	J	1-3	PZ90040	CABLE ASSEMBLY E
PB-81J	D	1	PM-0003	SEL1035 (RED)
PB-82H	D	1-5	PNTLG208	TLG208 (GREEN)

NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTANCE VALUES ARE IN OHMS. ¼W. 5%.
2. CAPACITANCE VALUES ARE IN FARADS. 50V.
3. CAPACITOR SYMBOL MARKS ARE AS FOLLOWS.
: ALUMINUM ELECTROLYTIC CAPACITOR.
: BIPOLAR ALUMINUM ELECTROLYTIC CAPACITOR.
: MYLAR FILM CAPACITOR (±5%, 50V)
: POLYSTYRENE FILM CAPACITOR (±5%, 50V)
: CERAMIC CAPACITOR.
: MICA CAPACITOR (±5%)
: TANTALUM ELECTROLYTIC CAPACITOR.
: POLYPROPYLENE FILM CAPACITOR (±5%)
: LOW LEAKAGE CURRENT ELECTROLYTIC CAPACITOR.
: METALLIZED PAPER CAPACITOR (±10%)
: SPARK KILLER.
4. ▲: SAFETY COMPONENT : REPLACE ONLY WITH THE SPECIFIED COMPONENT FOR SAFETY REASON.

NAME AUDIO CONTROL ASS'Y
PART NO. CR2390A
DWG. NO. 3-71



TYPE NO(A)TO
( )AT THE END

DWG NO. 3-6445

NAME	AUTO LOCATOR	SHEET 1 OF 1
PART NO.	CB1090B	
APPLIED	CB-109B	